e-Front runners

High Performance Vector Control Inverter
FRENIC-VG Series

FUJI INVERTERS

High performance enabled by the comprehensive use of Fuji technology.
Easy maintenance for the end-user.
Maintains safety and protects the environment.
Opens up possibilities for the new generation.

MEH659

The Dawn of a New Era

The FRENIC-VG is ushering in a new era with the best performance in the industry.

FRENIC-VG
NEW
FRENIC-VG
FUJI INVERTERS
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With the FRENIC-VG, Fuji has concentrated its technologies to deliver the best-performing inverter on the market. In addition to basic performance, this model features the following dramatic improvements: support for previously difficult applications due to technical and capability limitations, easier, more user-friendly maintenance, and environmental friendliness and safety. Fuji Electric proudly introduces the FRENIC-VG to the world.

FRENIC-VG CONCEPT

Improved control capacity

- High overload resistance (200% 3sec)
- Improved torque accuracy (±3%)
- Improved quick response (600Hz)
- Low torque ripple
- Improved sensorless control performance (torque increased at low speed)
- Improved auto tuning accuracy

A wide range of applications

- Triple ratings available on intended use
- Servo function
- Synchronous motor drive
- Various optional cards supported (20 types or more)

Easier maintenance and greater reliability

- **Quicker adjustment, start, replacement, and restoration times**
  USB port, high functional loader, compatibility with earlier models, and ASR auto tuning
- **Fault diagnosis**
  Trace back, clock function, and fault information
- **Reliability**
  Individual output of serious and minor alarms, long-life parts, and PG fault detection function

Environmental friendliness and safety

- **Conformity to functional safety standards**
  (Standard: STO incorporated) (Option: STO, SS1, SLS, and SBC can be incorporated)
- **Environmental resistance**
  RoHS (standard), durable against salt corrosion and sulfidizing gas
- **Supports harmonics suppression (12-pulse rectification)**
  (Applicable capacity: supports the capacity of 132 kW or higher for each unit)

Standard Specifications
Common Specifications
Protective Functions
External Dimensions
Dedicated Motor Specifications
External Dimensions of Dedicated Motors
Terminal Functions
Wiring Diagram
Terminal Arrangement Diagram
Names and Functions of KEYPAD
Function Setting
Options
Wiring Equipment
Warranty
Delivery Period and Code
Guideline for Suppressing Harmonics

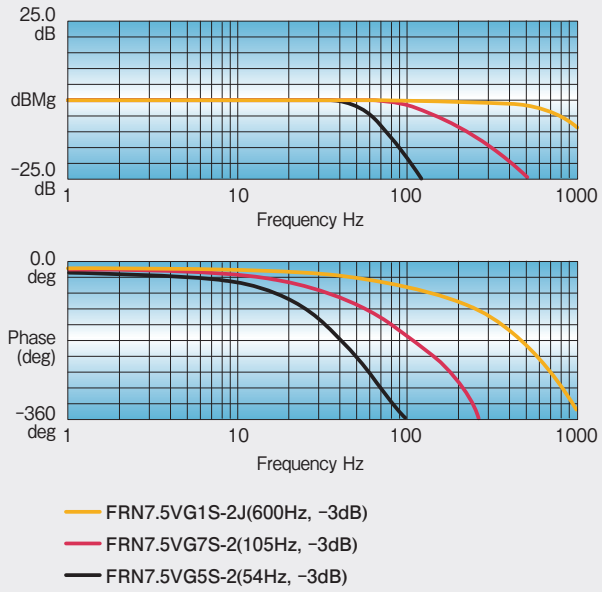
Improved Control Performance

Materialized industry's best control performance

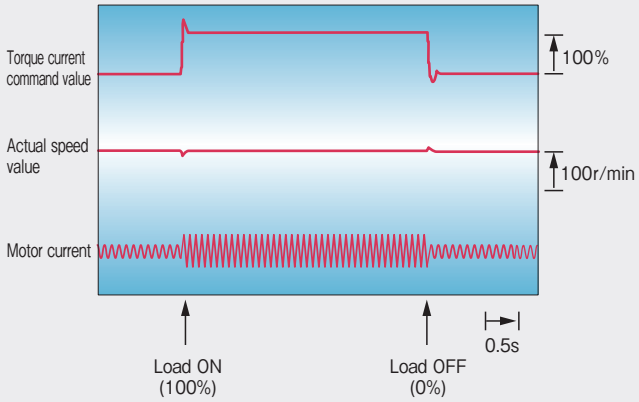
Induction Motor

Achieved speed response of 600Hz

(Tested with a dedicated motor with PG under vector control with speed sensor: about six times greater than our conventional model)



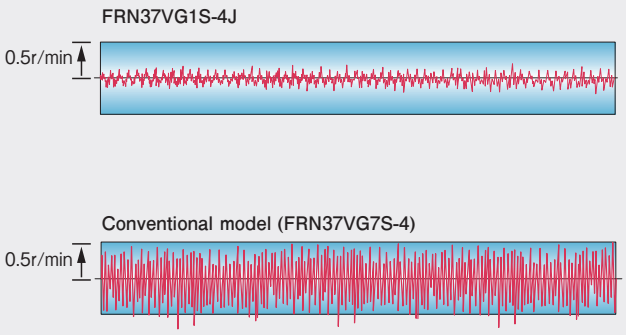
Follow-up characteristics under impact load



FRN37VG1S-4J, at 500r/min operation

Uneven rotation Reduced by one-third*

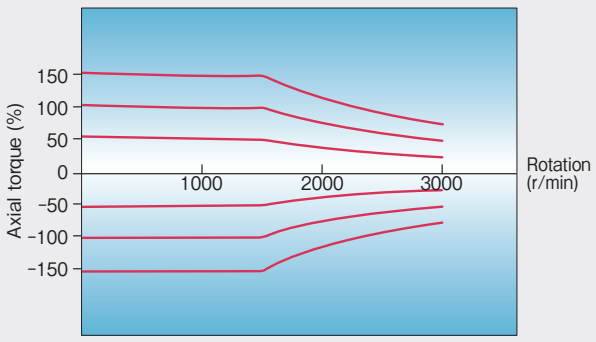
*Compared to our conventional model



At 30r/min operation

Speed and torque characteristics

Torque accuracy ±3%



FRN37VG1S-4J

A Wide Range of Applications

Ratings for intended use

The operation mode for the motor is selected according to motor load condition. Motors larger by one or two frames can be driven with medium load (MD) and light load (LD) use.

Specification	Applied load	Feature	Applicable overload rating
HD	High Duty Spec (standard)	Powerful drive at low noise	Current: 150% 1min/200% 3sec
MD*3	Middle Duty Spec	Can drive motors of frames one size larger *1	Current: 150% 1min, carrier 2kHz *2
LD	Low Duty Spec	Can drive motors of frames one or two sizes larger *1	Current: 120% 1min

(Notes) *1: Varies depending on the motor specification and power supply voltage.
*2: This will increase noise. Check the motor installation environment.
*3: The MD specification comes with only 400V series (90 to 400 kW).

Capacity range expanded of brake circuit

Having a standard built-in brake circuit (with 200V 55kW or less and 400V 160KW or less), is useful when applying the inverter to the vertical transfer machine, which is frequently used under the regenerative load.

Servo function (coming soon)

The following functions are enabled.
- Position control by built-in APC
- The ABS encoder I/F option card with 17-bit high resolution has been prepared.
  This is soon to be supported for position control.
- Pulse column input enabled (optional)
- The SX and E-SX bus I/F option card has been prepared.
  This is soon to be supported for position control.

Multi-drive function (Induction and synchronous motors)

- Highly efficient drive is achieved in driving together with our synchronous motor.
- Settings allow you to switch between induction and synchronous motor operation.

GNF2 series

GNB2 series

GNS1 series

	Induction motor	Synchronous motor
Sensor provided	MVK series	GNF2 series
Sensorless	——	(Coming soon) GNB2 series GNS1 series (High efficiency)

A wide range of options

- The new model offers options that enable various interfaces, including high-speed communication.
- Options can be used by just inserting them into the connectors inside the inverter. Up to five cards can be mounted.
  (There are some restrictions on how optional cards may be combined. Contact Fuji for details)

Type	Name		Type
Analog card	Synchronized interface*1		OPC-VG1-SN
	F/V converter*1		OPC-VG1-FV
	Aio expansion card		OPC-VG1-AIO
	Ai expansion card		OPC-VG1-AI
Digital card (for 8-bit bus)	Di interface card		OPC-VG1-DI
	Dio expansion card		OPC-VG1-DIO
	PG interface expansion card	+5V line driver	OPC-VG1-PG
		Open collector	OPC-VG1-PGo
		NEW (NEW) ABS encoder with 17-bit high resolution	OPC-VG1-SPGT
	PG card for synchronous motor drive	Line driver	OPC-VG1-PMPG
		Open collector	OPC-VG1-PMPGo
	T-Link interface card		OPC-VG1-TL
	CC-Link interface card		OPC-VG1-CCL
Digital card (for 16-bit bus)	SX bus interface card		OPC-VG1-SX
	NEW E-SX bus interface card		OPC-VG1-ESX
	User programming card*1		OPC-VG1-UPAC
Safety card	NEW Functional safety card		OPC-VG1-SAFE
Field bus interface card	PROFIBUS-DP interface card*1		OPC-VG1-PDP
	DeviceNet interface card*1		OPC-VG1-DEV
Control circuit terminal	Terminal block for high-speed serial communications		OPC-VG1-TBSI

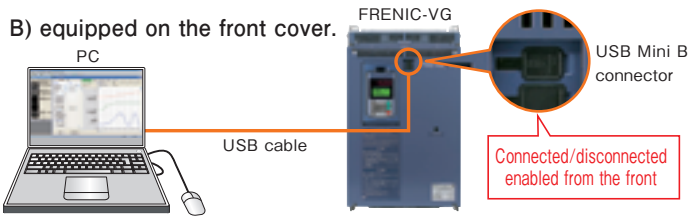
*1 Coming soon

Easier Maintenance and Greater Reliability

Upgraded PC loader functions

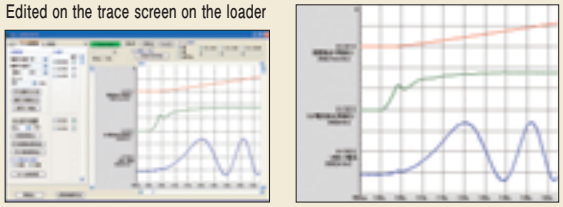
FRENIC-VG Loder can be used via the USB connector (mini B) equipped on the front cover.

- The front cover does not have to be removed.
- No RS-485 converter is needed.
- Commercial cables can be used.



【Fault diagnosis using the trace back function】

Edited on the trace screen on the loader



- Internal data and date around the fault are recorded.
  NEW The real-time clock (clock function) is built-in as standard.
- Data are backed up by battery.
  (NOTE) Battery: 30kW or more (built-in as standard), up to 22kW (available as option:OPK-BP)
- Trace waveform can be checked on the PC loader

【Easy edit and detail monitor】

Data editing and detailed data monitor analysis operations are must easier than with a conventional PC loader.

Function code setting User-defined displays (customized displays), data explanation display for each code.

Trace function Real-time trace: for long-term monitoring
Historical trace: for detailed data diagnosis for short periods
Trace back: for fault analysis (last three times)

(Note) Real-time and historical traces are available in the fare-paying loader software (WPS-VG1-PCL). The trace data can be stored in the internal memory even when the power is shut off (for inverters with 22kW or less, this function is available using the optional battery for memory backup).

Multifunctional KEYPAD

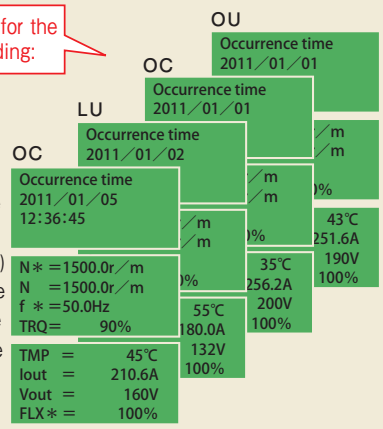
- Wide 7-segment LED ensures easy view.
- Backlighted LCD display allows the operator to see the display clearly, even on a dark control panel.
- NEW Enhanced copy function
  The function codes can be copied to other inverters easily. (Three patterns of function codes can be stored.) Copying data in advance reduces restoration time when problems occur, by replacing the KEYPAD when changing the unit.
- Remote control operation is available.
  The KEYPAD can be remotely operated by extending the cable length at the RJ connector.
- JOG (jogging) operation can be executed using the KEYPAD.
- NEW The HELP key displays operation guidance.

More reliable functions

Save alarm data

Detailed data are stored for the last four alarms, including:

- Time to sound alarm
- Speed setting value
- Detection speed value
- Torque command value
- Temperature
  (heat sink, internal temperature)
- Accumulated operation time
- Output current detection value
- Magnetic-flux reference value
- I/O status



- NEW The number of alarm data to be stored has been increased from the conventional model.
  With the real-time clock function built-in as standard, the latest and the last three pieces of alarm data on time, speed command, torque, current and others can be stored. This enables machine units to be checked for abnormalities.

⇒Previously alarm data were deleted to overwrite spin-off alarm data. This is resolved with the new VG model.

Alarm severity selection

Alarm severity (serious and minor) can be selected, eliminating the risk of critical facility stoppage due to a minor fault.

	30-relay output	Y-terminal output	Inverter output	Selection
Motor overload, communications error, DC fan lock, etc.	Not output (minor fault)	Provided	Operation continued	Can be selected for each function.
	Output	None	Shutoff	
Blown fuse, excessive current, ground fault, etc.	Output	None	Shutoff	Fixed

PG fault diagnosis

- NEW The PG interface circuit incorporated as standard detects disconnection of the power supply line as well as the PG signal line.
- Operation can be continued in sensorless mode during PG disconnection or fault. (Soon to be supported)
  Old model: The inverter was stopped by a trip and the motor runs freely.
  New model: The mode is automatically switched to sensorless vector control mode when a PG fault is detected, minimizing effect to the machined products.
  (Control performance during the sensorless control is lower than with PG vector control. Check operating conditions in advance by combining the sensorless mode to your units or machines to see whether the torque applied at low speed is sufficient or not.)
- NEW A mode that judges if it is a PG fault or fault on the inverter side was added
  Simulated output mode is provided at the PG pulse output terminal (FA and FB). Operation can be checked by connecting this to the PG input terminal.

Components with a longer service life

For the various consumable parts inside the inverter, their designed lives have been extended to 10 years, which also extended the equipment maintenance cycles.

Life-limited component name	Planned life
Cooling fan	10 years
Smoothing capacitor on main circuit	
Electrolytic capacitors on PCB	

Life conditions

Ambient temperature: 40°C, load factor: 100% (HD spec), 80% (MD and LD specs)

(Note) The planned life is determined by calculation, and is not a guaranteed value.

Useful functions for test run and adjustment

- Customization of function code display
  (Individual items on the loader can be set to display or not.)
- Each communications I/O map input/output status is displayed (for PLC software debug) on the loader or KEYPAD (KEYPAD is soon to be supported).
- NEW Simulated fault alarm issued by a special operation on the KEYPAD
- NEW Monitor data hold function
- Simulated operation mode
  Simulated connection allows the inverter to be operated with internal parts in the same way as if they were connected to the motor, without actually being connected.
- The externally input I/O monitor and PG pulse states can be checked on the KEYPAD.
- ASR auto tuning (Soon to be supported)

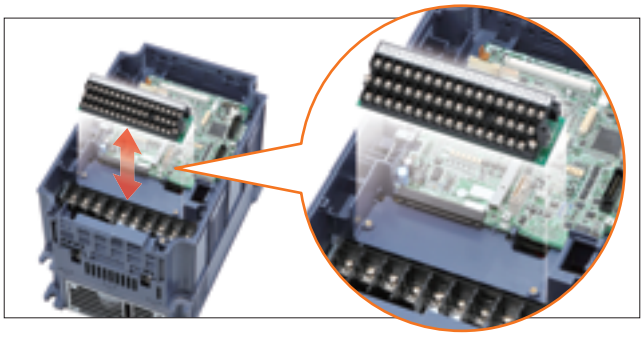
Enhanced lifetime alarm

- Lifetime alarms can be checked readily on the KEYPAD and the PC loader (optional).
- Facility maintenance can be performed much easier thanks to lifetime alarms.

Items			
Inverter accumulated time (h)	No. of inverter starts (times)	Facility maintenance warning Accumulated time (h) No. of starts (times)	Inverter lifetime alarm information is displayed.

Easy wiring (removable control terminal block)

- The terminal block can be connected to the inverter after control wiring work is complete. Wiring work is simplified.
- Restoration time for updating equipment, problem occurrence, and inverter replacement has been drastically reduced. Just mount the wired terminal block board to the replaced inverter.



Adaptation to Environment and Safety

Conforms to safety standards (Soon to be supported)

- The safety function STO that conforms to the function safety standard EN61800-5-2 is incorporated as standard.
- The safety functions STO, SS1, SLS, and SBC that conform to safety standard EN61800-5-2 can be incorporated by adding the function safety option OPC-VG1-SAFE. (Available only when combined with the dedicated motor MVK.)

Safety function STO: Safe Torque Off
This function shuts down the output of torque with the motor immediately.

Safety function SS1: Safe Stop 1
This function decreases the motor speed to shut down the motor by torque output OFF by the STO function immediately when the motor reaches the specified speed or after the specified time has elapsed.

Safety function SLS: Safely Limited Speed
This function prevents the motor from rotating over the specified speed.

Safety function SBC: Safe Brake Control
This functions outputs signals the control the motor brake.

Enhanced environmental resistance

Environmental resistance has been enhanced compared to conventional inverters.

(1) Environmental resistance of cooling fan has been enhanced.
(2) Ni and Sn coatings are employed on copper bars.

Environmental resistance has been enhanced on the FRENIC-VG compared to conventional models; however, the following environments should be examined based on how the equipment is being used.

a. Sulfidizing gas (used as a part of the business such as with tire manufacturers, paper manufacturers, sewage treatment, and the textile industry)

b. Conductive dust and foreign particles (such as with metal processing, extruding machines, printing machines, and waste treatment)

c. Others: under unique environments not included under standard environments

Contact Fuji before using the product in environments such as those indicated above.

RoHS Directive compliance

VG complies with European regulations that limit the use of specific hazardous substances (RoHS) as a standard.

Six hazardous substances

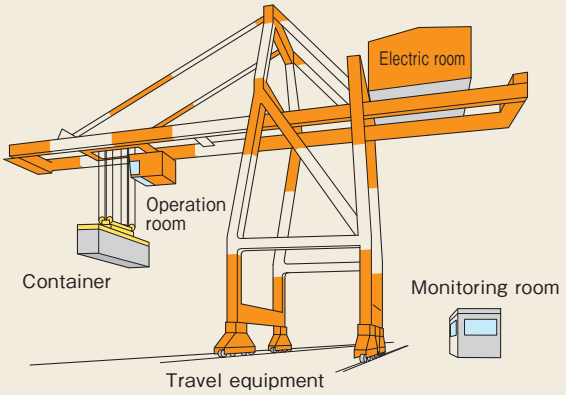
Lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl (PBB), and polybrominated biphenyl ether (PBDE)
(Note) Does not apply to the parts of some inverter models.

About RoHS

Directive 2002/95/EC, promulgated by the European Parliament and European Council, limits the use of specific hazardous substances included in electrical and electronic devices.

Application Examples

Large crane and overhead crane



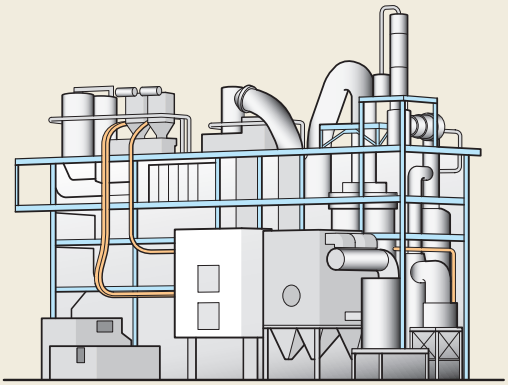
High reliability

VG supports your facility with long life service and high reliability.
The trace back function allows easy fault diagnosis.

System support

The bus system is supported to allow centralized control of elevation, traverse, and trolley, as well as centralized monitoring of running conditions.

Application to plants



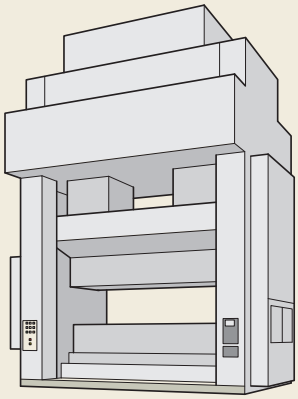
Control with high speed and high accuracy

In addition to high speed and high accuracy, VG contributes to stable facility operation with high reliability and long service life. The trace back function makes diagnosing the cause of problems easy when an abnormality arises.

System support

Centralized control and monitoring are achieved by supporting various fieldbuses.

Servo press: large size for automobiles, small size for machines such as crimping terminal processing machines



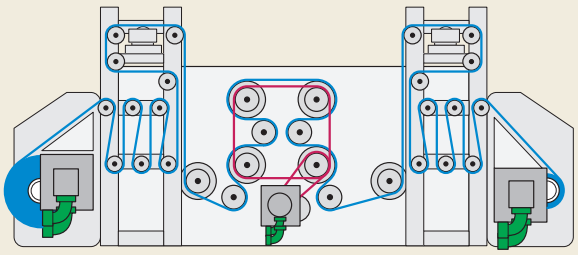
Position control

The press position is controlled based on an instantaneous position command given by the CNC of the high order.
Control with high responsibility contributes to shortening of the operation cycle.

Precision synchronization control

Large machines are driven with several motors to increase thrust. Precision synchronization control of several inverters and motors using the high-speed bus system can be applied.

Winding equipment (paper and metal)



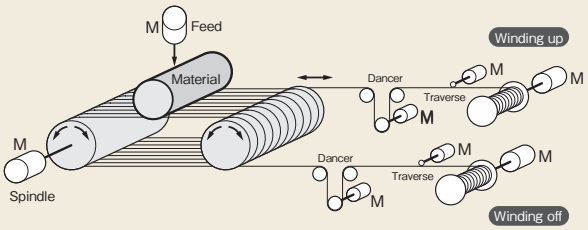
Tension control

Tension-type winding control capability with high accuracy torque control has been improved. Dancer-type winding control capability by the speed control with high speed response has been improved.

System support

The controller that calculates winding diameter achieves constant tension control.

Feeding part of semiconductor manufacturing device, wire saw



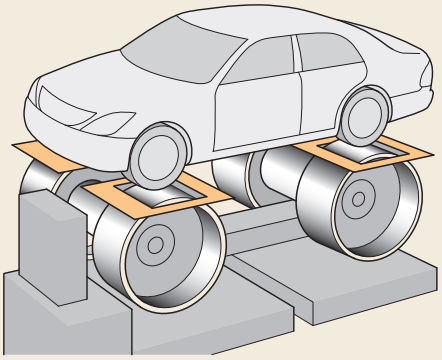
Smooth torque characteristic

The smooth drive characteristic in which torque ripple is suppressed contributes to machining quality.

System support

The system has been made simple and highly efficient by connecting and controlling the spindle that drives wires and the small-capacity servo that drives the traverse axis and winding up and off axes in the same bus system.

Test equipment for automobiles



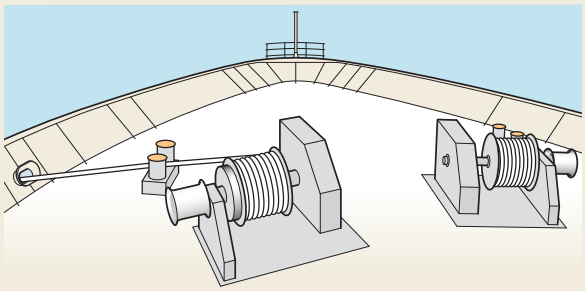
High-speed response control

High-speed rotation and torque control with high response are available for engine and transmission tests.

System support

The system can be supported in cases such as the vehicle body inertia simulation function for a brake test apparatus by combining with the controller.

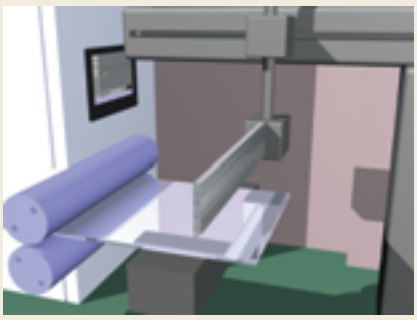
Shipboard winch



High reliability and tension control

Torque is controlled up to extra low speed using the sensorless feature.
Stable drive is maintained against load variation caused by waves.

Flying shear (Cutting while moving)



Position control

Position control is performed according to the position command given by the high-order CNC. The machine cuts the blank while moving at the same speed as the blank.

System support

The system is configured by a controller that calculates synchronous operation among the blank feed axis, cutter feed axis and cut axis.

Variation

Nominal applied motor (kW)	200V Series HD (150% 1min.,200% 3sec.)	200V Series LD (120% 1min.)	400V Series HD (150% 1min.,200% 3sec.)	400V Series MD (150% 1min.)	400V Series LD (120% 1min.)
Applied load	High Duty Spec	Low Duty Spec	High Duty Spec	Middle Duty Spec	Low Duty Spec
0.75	FRN0.75VG1S-2J				
1.5	FRN1.5VG1S-2J				
2.2	FRN2.2VG1S-2J				
3.7	FRN3.7VG1S-2J		FRN3.7VG1S-4J		
5.5	FRN5.5VG1S-2J		FRN5.5VG1S-4J		
7.5	FRN7.5VG1S-2J		FRN7.5VG1S-4J		
11	FRN11VG1S-2J		FRN11VG1S-4J		
15	FRN15VG1S-2J		FRN15VG1S-4J		
18.5	FRN18.5VG1S-2J		FRN18.5VG1S-4J		
22	FRN22VG1S-2J		FRN22VG1S-4J		
30	FRN30VG1S-2J		FRN30VG1S-4J		
37	FRN37VG1S-2J	FRN30VG1S-2J	FRN37VG1S-4J		FRN30VG1S-4J
45	FRN45VG1S-2J	FRN37VG1S-2J	FRN45VG1S-4J		FRN37VG1S-4J
55	FRN55VG1S-2J	FRN45VG1S-2J	FRN55VG1S-4J		FRN45VG1S-4J
75	FRN75VG1S-2J	FRN55VG1S-2J	FRN75VG1S-4J		FRN55VG1S-4J
90	FRN90VG1S-2J	FRN75VG1S-2J	FRN90VG1S-4J		FRN75VG1S-4J
110		FRN90VG1S-2J	FRN110VG1S-4J	FRN90VG1S-4J	FRN90VG1S-4J
132			FRN132VG1S-4J	FRN110VG1S-4J	FRN110VG1S-4J
160			FRN160VG1S-4J	FRN132VG1S-4J	FRN132VG1S-4J
200			FRN200VG1S-4J	FRN160VG1S-4J	FRN160VG1S-4J
220			FRN220VG1S-4J	FRN200VG1S-4J	FRN200VG1S-4J
250				FRN220VG1S-4J	
280			FRN280VG1S-4J		FRN220VG1S-4J
315			FRN315VG1S-4J	FRN280VG1S-4J	
355			FRN355VG1S-4J	FRN315VG1S-4J	FRN280VG1S-4J
400			FRN400VG1S-4J	FRN355VG1S-4J	FRN315VG1S-4J
450				FRN400VG1S-4J	FRN355VG1S-4J
500			FRN500VG1S-4J		FRN400VG1S-4J
630			FRN630VG1S-4J		FRN500VG1S-4J
710					FRN630VG1S-4J

*When a motor which is larger than the inverter by one frame or more for FRN55VG1□-2J/4J or higher inverters (applicable motor 75kW or more), the type of DC reactor, which is a standard accessory, is different among HD, MD and LD specifications. (Shifted by one frame)

How to read the model number

FRN 5.5 □ VG 1 S - 2 J □□

Code	Series name
FRN	FRENIC Series

Code	Nominal applied motor capacity
0.75	0.75kW
1.5	1.5kW
2.2	2.2kW
3.7	3.7kW
5.5	5.5kW
≀	≀
630	630kW(HD) 710kW(LD)

Code	Cabinet
None	Unit type

Code	Application range
VG	High performance vector control

Special type

Code	Language
J	Japanese
E	English
C	Chinese
Z	Optional language

Code	Input power source
2	Three-phase 200V
4	Three-phase 400V

Code	Structure
S	Standard

Code	Developed inverter series
1	Series

(Note) Built-in options: Not provided, braking relation: The standard specification type shown in above list is employed for the standard model.

Caution! The product detail described in this document is intended for selecting a model. When using a product, read the Instruction Manual carefully and use the product properly.

Standard Specifications

HD specification for high duty spec

Three-phase 200V series (unit type)

Type FRN□VG1S-2J		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Nominal applied motor [kW]		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Rated capacity [kVA] (*1)		1.9	3.0	4.1	6.8	10	14	18	24	28	34	45	55	68	81	107	131
Rated current [A]		5	8	11	18	27	37	49	63	76	90	119	146	180	215	283	346
Overload current rating		150% of rated current -1min. (*2) 200% -3sec. (*3)															
Input power	Main power Phase, Voltage, Frequency	3-phase 200 to 230V,50Hz/60Hz										3-phase 200 to 220V/50Hz, 200 to 230V/60Hz (*4)					
	Auxiliary input for control power Phase, Voltage, Frequency	Single phase 200 to 230V,50Hz/60Hz															
	Auxiliary input for fan power Phase, Voltage, Frequency (*5)	–											Single phase 200 to 220V/50Hz, 200 to 230V/60Hz (*4)				
	Voltage/frequency variation	Voltage: +10 to -15% (Voltage unbalance: 2% or less (*6)), Frequency: +5 to -5%															
	Rated current [A] (with DCR) (*7) (without DCR)	3.2	6.1	8.9	15.0	21.1	28.8	42.2	57.6	71.0	84.4	114	138	167	203	282	334
		5.3	9.5	13.2	22.2	31.5	42.7	60.7	80.1	97.0	112	151	185	225	270	–	–
	Required power supply capacity [kVA] (*8)	1.2	2.2	3.1	5.2	7.4	10	15	20	25	30	40	48	58	71	98	116
Braking method /braking torque		Braking resistor discharge control: 150% braking torque, Separately installed braking resistor (option), Separately installed braking unit (option for FRN75VG1S-2J or higher)															
Carrier frequency [kHz] (*9)		2 to 15														2 to 10	
Approx. weight [kg]		6.2	6.2	6.2	6.2	6.2	6.2	11	11	11	12	25	32	42	43	62	105
Enclosure		IP20 closed type										IP00 open type (IP20 closed type is available as option)					

Three-phase 400V series (unit type)

Type FRN□VG1S-4J		3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630
Nominal applied motor [kW]		3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630
Rated capacity [kVA] (*1)		6.8	10	14	18	24	29	34	45	57	69	85	114	134	160	192	231	287	316	396	445	495	563	731	891
Rated current [A]		9.0	13.5	18.5	24.5	32.0	39.0	45.0	60.0	75.0	91.0	112	150	176	210	253	304	377	415	520	585	650	740	960	1170
Overload current rating		150% of rated current -1min. (*2) 200% -3sec. (*3)																							
Input power	Main power Phase, Voltage, Frequency	3-phase 380 to 480V,50Hz/60Hz											3-phase 380 to 440V/50Hz, 380 to 480V/60Hz (*4)												
	Auxiliary input for control power Phase, Voltage, Frequency	Single phase 380 to 480V,50Hz/60Hz																							
	Auxiliary input for fan power Phase, Voltage, Frequency (*5)	–											Single phase 380 to 440V/50Hz, 380 to 480V/60Hz (*4)												
	Voltage/frequency variation	Voltage: +10 to -15% (Voltage unbalance: 2% or less (*6)), Frequency: +5 to -5%																							
	Rated current [A] (with DCR) (*7) (without DCR)	7.5	10.6	14.4	21.1	28.8	35.5	42.2	57.0	68.5	83.2	102	138	164	210	238	286	357	390	500	559	628	705	881	1115
		13.0	17.3	23.2	33	43.8	52.3	60.6	77.9	94.3	114	140	–	–	–	–	–	–	–	–	–	–	–	–	–
	Required power supply capacity [kVA] (*8)	5.2	7.4	10	15	20	25	30	40	48	58	71	96	114	140	165	199	248	271	347	388	436	489	610	773
Braking method /braking torque		Braking resistor discharge control: 150% braking torque, Separately installed braking resistor (option), Separately installed braking unit (option for FRN200VG1S-4J or higher)																							
Carrier frequency [kHz] (*9)		2 to 15											2 to 10											2 to 5	
Approx. weight [kg]		6.2	6.2	6.2	11	11	11	11	25	26	31	33	42	62	64	94	98	129	140	245	245	330	330	555	555
Enclosure		IP20 closed type							IP00 open type (IP20 closed type is available as option)																

Note 1) The specifications above are established when the function code F80 = 0 (HD specification) is applied. When used with the HD specification with 75kW or more, the DC Reactor is provided as standard.

*1) The rated output voltage is 220V for 200V series and 440V for 400V series.

*2) When the inverter output frequency converter value is 10Hz or less, the inverter may trip early due to overload depending on the conditions such as ambient temperature.

*3) When the inverter output frequency converted value is 5Hz or less, the inverter may trip early due to overload depending on the conditions such as ambient temperature.

*4) 200V series: Make an individual order for 220 to 230V/50Hz.
400V series: The inverters with the power supply of 380 to 398V/50Hz and 380 to 430V/60Hz must be switched with the connector inside the inverter. The output of the inverter with 380V may drop depending on situations. For the detail, refer to the FRENIC-VG User Manual 10.5.

*5) The auxiliary power input is used as an AC fan power input when combining the unit such as high power factor PWM converter with power regenerative function. (Generally not used.)

*6) Voltage unbalance [%] = (Max. voltage [V] - Min. voltage [V])/Three-phase average voltage [V] × 67
Use the AC reactor if the voltage unbalance exceeds 2%.

*7) The value is calculated on assumption that the inverter is connected with a power supply capacity of 500kVA (or 10 times the inverter capacity if the inverter capacity exceeds 50kVA) and %X is 5%.

*8) This shows values when the DC reactor is used. (Optional for 55kW or less model)

*9) The inverter may automatically reduce carrier frequency in accordance with ambient temperature or output current in order to protect itself.

Standard Specifications

MD specification for middle duty spec

Three-phase 400V series

Type FRN□VG1S-4J		90	110	132	160	200	220	280	315	355	400
Nominal applied motor [kW] (*7)		110	132	160	200	220	250	315	355	400	450
Rated capacity [kVA] (*1)		160	192	231	287	316	356	445	495	563	640
Rated current [A]		210	253	304	377	415	468	585	650	740	840
Overload current rating		150% of rated current -1min.									
Input power	Main power Phase, Voltage, Frequency	3-phase 380 to 440V/50Hz, 380 to 480V/60Hz (*2)									
	Auxiliary input for control power Phase, Voltage, Frequency	Single phase 380 to 480V, 50Hz/60Hz									
	Auxiliary input for fan power Phase, Voltage, Frequency (*3)	Single phase 380 to 440V/50Hz, 380 to 480V/60Hz (*2)									
	Voltage/frequency variation	Voltage: +10 to -15% (Voltage unbalance: 2% or less (*4)), Frequency: +5 to -5%									
	Rated current [A] (with DCR) (*5) (without DCR)	210	238	286	357	390	443	559	628	705	789
		–									
	Required power supply capacity [kVA] (*6)	140	165	199	248	271	312	388	436	489	547
Braking method /braking torque		Braking resistor discharge control: 150% braking torque, Separately installed braking resistor (option)				Braking resistor discharge control: 150% braking torque, Separately installed braking resistor (option), Separately installed braking unit (option)					
Carrier frequency [kHz]		2									
Approx. weight [kg]		62	64	94	98	129	140	245	245	330	330
Enclosure		IP00 open type (IP20 closed type is available as option)									

Note 1) The specifications above are established when the function code F80 = 3 (MD specification) is applied. When used with the MD specification with 90kW or more, the DC Reactor is provided as standard.

*1) Inverter output capacity [kVA] at 440V.

*2) The inverters with the power supply of 380 to 398V/50Hz and 380 to 430V/60Hz must be switched with the connector inside the inverter.

*3) The auxiliary power input is used as an AC fan power input when combining the unit such as high power factor PWM converter with power regenerative function. (Generally not used.)

*4) Voltage unbalance [%] = (Max. voltage [V] - Min. voltage [V])/Three-phase average voltage [V] × 67
Use the AC reactor if the voltage unbalance exceeds 2%.

*5) The value is calculated on assumption that the inverter is connected with a power supply capacity of 10 times the inverter capacity and %X is 5%.

*6) This shows values when the DC reactor is used.

*7) Since heat generation of the motor due to low carrier may be increased depending on the load condition, designate the MD specification when ordering the motor.

LD specification for low duty spec

Three-phase 200V series

Type FRN□VG1S-2J		30	37	45	55	75	90
Nominal applied motor [kW]		37	45	55	75	90	110
Rated capacity [kVA] (*1)		55	68	81	107	131	158
Rated current [A]		146	180	215	283	346	415
Overload current rating		120% of rated current -1min.					
Input power	Main power Phase, Voltage, Frequency	3-phase 200 to 220V/50Hz, 200 to 230V/60Hz (*2)					
	Auxiliary input for control power Phase, Voltage, Frequency	Single phase 200 to 230V, 50Hz/60Hz					
	Auxiliary input for fan power Phase, Voltage, Frequency (*3)	–	Single phase 200 to 220V/50Hz, 200 to 230V/60Hz (*2)				
	Voltage/frequency variation	Voltage: +10 to -15% (Voltage unbalance: 2% or less (*4)), Frequency: +5 to -5%					
	Rated current [A] (with DCR) (*5) (without DCR)	138	167	203	282	334	410
		185	225	270	–	–	–
	Required power supply capacity [kVA] (*6)	48	58	71	98	116	143
Braking method /braking torque		Braking resistor discharge control: 110% braking torque, Separately installed braking resistor (option), Separately installed braking unit (option for FRN75VG1S-2J or higher)					
Carrier frequency [kHz] (*7)		2 to 10				2 to 5	
Approx. weight [kg]		25	32	42	43	62	105
Enclosure		IP00 open type (IP20 closed type is available as option)					

Three-phase 400V series

Type FRN□VG1S-4J		30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630
Nominal applied motor [kW]		37	45	55	75	90	110	132	160	200	220	280	355	400	450	500	630	710
Rated capacity [kVA] (*1)		57	69	85	114	134	160	192	231	287	316	396	495	563	640	731	891	1044
Rated current [A]		75	91	112	150	176	210	253	304	377	415	520	650	740	840	960	1170	1370
Overload current rating		120% of rated current -1min.																
Input power	Main power Phase, Voltage, Frequency	3-phase 380 to 480V, 50Hz/60Hz				3-phase 380 to 440V/50Hz, 380 to 480V/60Hz (*2)												
	Auxiliary input for control power Phase, Voltage, Frequency	Single phase 380 to 480V, 50Hz/60Hz																
	Auxiliary input for fan power Phase, Voltage, Frequency (*3)	–				Single phase 380 to 440V/50Hz, 380 to 480V/60Hz (*2)												
	Voltage/frequency variation	Voltage: +10 to -15% (Voltage unbalance: 2% or less (*4)), Frequency: +5 to -5%																
	Rated current [A] (with DCR) (*5) (without DCR)	68.5	83.2	102	138	164	210	238	286	357	390	500	628	705	789	881	1115	1256
		94.3	114	140	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Required power supply capacity [kVA] (*6)	48	58	71	96	114	140	165	199	248	271	347	436	489	547	611	773	871
Braking method /braking torque		Braking resistor discharge control: 110% braking torque, Separately installed braking resistor (option), Separately installed braking unit (option for FRN200VG1S-4J or higher)																
Carrier frequency [kHz] (*7)		2 to 10				2 to 5												2
Approx. weight [kg]		25	26	31	33	42	62	64	94	98	129	140	245	245	330	330	555	555
Enclosure		IP00 open type (IP20 closed type is available as option)																

Note 1) The specifications above are established when the function code F80 = 1 (LD specification) is applied. When used with the LD specification with 55kW or more, the DC Reactor is provided as standard.

*1) The rated output voltage is 220V for 200V series and 440V for 400V series.

*2) 200V series: Make an individual order for 220 to 230V/50Hz.
400V series: When the input voltage is 380 to 398V/50Hz or 380 to 430V/60Hz, the connector inside the inverter must be switched.

*3) The auxiliary power input is used as an AC fan power input when combining the unit such as high power factor PWM converter with power regenerative function. (Generally not used.)

*4) Voltage unbalance [%] = (Max. voltage [V] - Min. voltage [V])/Three-phase average voltage [V] × 67
Use the AC reactor if the voltage unbalance exceeds 2%.

*5) The value is calculated on assumption that the inverter is connected with a power supply capacity of 500kVA (or 10 times the inverter capacity if the inverter capacity exceeds 50kVA) and %X is 5%.

*6) This shows values when the DC reactor is used. (Optional for FRN45VG1S-2J and FRN45VG1S-4J or lower model)

*7) The inverter may automatically reduce carrier frequency in accordance with ambient temperature or output current in order to protect itself.

Common Specifications

Common specifications for inverters

Item				Specifications
Control	Motor control method	For induction motor		Vector control w/ speed sensor Speed sensorless vector control V/f control
		For synchronous motor		Vector control w/ speed sensor (including magnetic pole position detection)
		Test mode		Simulated operation mode
Induction motor control	Vector control w/ speed sensor	Setting resolution	Speed setting	Analog setting: ±0.005% of max. speed Digital setting: ±0.005% of max. speed
			Torque setting Torque current setting	0.01% of rated torque
		Control accuracy	Speed	Analog setting: ±0.1% of max. speed (25±10°C) Digital setting: ±0.005% of max. speed (-10 to 50°C)
			Torque	±3% of rated torque (w/ dedicated motor)
		Control response	Speed	600Hz *1
		Maximum speed		800Hz by inverter output frequency conversion *1
		Speed control range		1:1500 When the base speed is 1500 r/min, 1 to 1500 r/min to max. speed (w/ no. of PG pulses is 1024P/R) 1:6 (constant torque range: constant output range)
Induction motor control	Speed sensorless vector control	Setting resolution	Speed setting	Analog setting: ±0.005% of max. speed Digital setting: ±0.005% of max. speed
			Torque setting Torque current setting	0.01% of rated torque
		Control accuracy	Speed	Analog setting: ±0.1% of max. speed (25±10°C) Digital setting: ±0.1% of max. speed (-10 to 50°C)
			Torque	±5% of rated torque
		Control response	Speed	40Hz *1
		Maximum speed		500Hz by inverter output frequency conversion *1
		Speed control range		1:250 When the base speed is 1500 r/min, 6 to 1500 r/min to max. speed 1:4 (constant torque range: constant output range)
	V/f control	Setting resolution		Analog setting: ±0.005% of max. speed Digital setting: ±0.005% of max. speed
		Output frequency control accuracy		Analog setting: ±0.2% of max. output frequency (25±10°C) Digital setting: ±0.01% of max. output frequency (-10 to 50°C)
		Maximum frequency		500Hz
		Control range		0.2 to 500Hz 1:4 (constant torque range: constant output range)
Synchronous motor control	Vector control w/ speed sensor	Setting resolution	Speed setting	Analog setting: ±0.005% of max. speed Digital setting: ±0.005% of max. speed
			Torque setting	0.01% of rated torque
		Control accuracy	Speed	Analog setting: ±0.1% of max. speed (25±10°C) Digital setting: ±0.005% of max. speed (-10 to 50°C)
			Torque	±3% of rated torque (w/ dedicated motor)
		Response control	Speed	600Hz *1
		Maximum speed		800Hz by inverter output frequency conversion *1

*1: Maximum value. This value may not be reached depending on the carrier frequency settings.

Item			Specifications
Synchronous motor control	Vector control w/ speed sensor	Speed control range	1:1500 (w/ no. of PG pulses is 1024P/R) When the base speed is 1500 r/min, 1 to 1500 r/min to max. speed
Control	Running and operation		KEYPAD operation: CW or CCW operation by FWD or REV key, and STOP key Digital input signal operation: FWD or REV command, coast-to-stop command, reset input, multistep speed selection command, etc.
	Speed setting		KEYPAD operation: ▲ or ▼ key External potentiometer: three terminals, 1 to 5kΩ Analog input: 0 to ±10V, 4-20mA UP/DOWN control: Speed increases when UP signal (DI) is ON, and decreases when DOWN signal (DI) is ON. Multistep speed: Up to 15 different speeds can be selected by combining four external input signals (DI). Serial link operation: RS-485 (standard). Setting through different communication options is possible. Jogging operation: FWD or REV key, or FWD or REV terminals in jogging mode
	Speed detection		Induction motor: +15V, +12V complimentary output PG (insulated) / max. receivable frequency: 100kHz +5V line driver output PG (insulated): w/ option card OPC-VG1-PG installed / max. receivable frequency: 500kHz Synchronous motor: +5V line driver output PG (insulated) <ABS type> W/ option card OPC-VG1-PMPG installed / max. receivable frequency: 100kHz <ABZ type> W/ option card OPC-VG1-PG installed / max. receivable frequency: 500kHz : ABS encoder with 17-bit high resolution (TS5667N253: made by Tamagawa Seiki) Servomotor serial PG TS5667N253 (made by Tamagawa Seiki, 17bit/turn and 16bit/multi-turns), w/ option card OPC-VG1-SPGT installed
	Speed control		The PI calculation w/ feed forward term is performed. Control invariable selection The control invariable can be selected by eternal signals.
	Running status signal		Transistor output: Inverter running, Speed equivalence, Speed detection, inverter overload early warning, torque limiting, etc. Analog output: Motor speed, Output voltage, Torque, Load factor, etc.
	Acceleration/Deceleration time		0.01 to 3600s (4 independent settings for acceleration and deceleration selectable with external signals) (S-curve acceleration/deceleration in addition to linear acceleration/deceleration)
	Gain for speed setting		Sets the proportional relationship between analog speed setting and motor speed in the range of 0 to 200%.
	Jump speed		Jump speed (3 points) and jump hysteresis width (1 point) can be set.
	Rotating motor pick up (Flying start)		A rotating motor can be smoothly picked up by the inverter without stopping.
	Auto-restart after momentary power failure		Automatic restart is available without stopping the motor after a momentary power failure.
	Slip compensation		Compensates for the decrease of speed due to load and realizes stable operation (by V/f control w/ induction motor).
	Droop control		The motor speed droops in proportion to output torque (disabled with V/f control).
	Torque limiting		Limits the torque to predetermined values (selectable from "common to 4 quadrants", "independent driving and braking", etc.) Analog and external signal (2 steps) settings are available.
	Torque control		Analog setting: 0 to ±10V /0 to ±150% (up to 300% by gain adjustment)
	PID control		Analog input by PID control is possible.
	Cooling fan ON/OFF control		Cooling fan is stopped during motor stoppage and low temperature to elongate the cooling fan life and reduce cooling fan noise.
	Toggle monitor control		Monitors the communications between the host device (PLC) and the inverter are functioned in a proper condition.

Common Specifications

Item			Specifications
Control	Torque bias		Internal setting (3 steps) and analog setting (hold function) are enabled by combining the fixed value (1 step, polarity switching by motor rotation direction function) and eternal signal (DI signal).
	Motor selection		Motor can be selected from three types by using (F79) or by combining the eternal signal (DI signal).
	Temperature detection		NTC thermister (Fuji Electric product or equivalent item) PTC thermister (trip level set by parameter) (for motor overheat protection)
	PG detection circuit self diagnosis		Self-diagnosis for detection circuit of the pulse encoder input signal (PA, PB)
	Load adaptive control function		Running efficiency of the unit can be improved by calculating the max. elevation speed achieved by the weight for a vertical transfer unit or other similar units.
	Multiple winding motor drive		Option: OPC-VG1-TBSI Only for PG vector control and sensorless vector control
	Reactor connection drive		
	UP/DOWN control		Speed setting is possible by combining the UP command, DOWN command, and zero clear command using the external signal (DI signal).
	Stopping function		3 types of stopping functions: STOP 1, 2 and 3.
	PG pulse output		Outputs the input pulse such as a motor PG signal by fixed or free frequency dividing. Open collector and complimentary (same voltage as PGP terminal) can be switched by setting the unit internal switch.
	Observer		Suppresses load disturbances and vibrations.
	Off-line tuning		Rotary type and non-rotary type are available for tuning the motor constant.
	On-line tuning		Used as a motor constant for compensating the temperature change.
	Position control		Standard function: position control by servo lock and built-in transmitting circuit. Options: OPC-VG1-PG (PR) : for line driver type pulse command input OPC-VG1-PGo (PR) : for open collector type pulse command input OPC-VG1-SPPG (PR): ABS encoder with 17-bit high resolution
	Pulse train synchronous operation		Options: OPC-VG1-PG (PR) : for line driver type pulse command input OPC-VG1-PGo (PR) : for open collector type pulse command input
Display and setting	KEYPAD	Display	7-segment LED, LCD w/ backlight
		Language display	Japanese, English, Chinese, Korean (French, Spanish, German, and Italy *1)
		Running/stopping	• Detected speed value • Speed reference value • Output frequency • Torque current reference value • Torque reference value • Torque calculation value • Power consumption (motor output) • Output current • Output voltage • DC link circuit voltage • Magnetic-flux reference value • Magnetic-flux calculation value • Load shaft speed • PID reference value • PID feedback value • PID output value • Ai adjusted value (12) • Ai adjusted value (Ai1) • Ai adjusted value (Ai2) • Optional monitor 1 to 6 • Presence of digital input/output signal • Motor temperature • Heat sink temperature • Load factor • Input power • Integral power consumption • Operation time • Motor accumulated operation time/no. of starts (for each motor), etc.
		Setting mode	Names and data are displayed.
		Alarm mode	Displays the following alarm codes; ·dbH (Braking resistance overheat) ·dCF (DC fuse blown) ·EF (Ground fault) ·Er1 (Memory error) ·Er2 (KEYPAD panel communication error) ·Er3 (CPU error) ·Er4 (Network error) ·Er5 (RS-485 error) ·Er6 (Operation procedure error) ·Er7 (Output wiring error) ·Er8 (A/D converter error) ·Er9 (Speed disagreement) ·Erb (Inter-inverter communication error) ·Lin (Input phase loss) ·LU (Undervoltage) ·nrb (NTC thermistor disconnection) ·OC (Overcurrent) ·OH1 (Overheating at heat sink) ·OH2 (External alarm input) ·OH3 (Inverter internal overheat) ·OH4 (Motor overheat) ·OL1 (Motor 1 overload) ·OL2 (Motor 2 overload) ·OL3 (Motor 3 overload) ·P9 (PG error) ·OLU (Inverter unit overload) ·OS (Overspeed) ·OU (Overvoltage) ·EC(Encoder communications error) ·PbF (Charging circuit error) ·dO (Excessive position deviation) ·dbA (Braking transistor abnormal) ·Et1(Encoder error) ·Err (Simulated fault) ·OPL (Output phase loss detection) ·dFA (DC fan lock) ·ErH(Hardware error)
		Minor fault	[L-AL] is displayed. Stores and displays the detailed cause that triggers the minor fault.
		Alarm during running	The latest and last ten pieces of alarm codes and the latest and the last three pieces of alarm detailed data are stored. Stores and displays alarm date and time by the calendar and time display function [accuracy: ±27 sec/month (Ta-25°C)]. Data stored period: 5 years or more (at ambient temperature 25°C) * Battery: built-in as standard for 30kW or higher models, available as option for up to 22kW models

*1: Soon to be supported.

Item			Specifications
Display and setting	Loader	Historical trace	Loads sampling data retained in the inverter to display with a graph. Sampling time: 50μs to 1s
		Real-time trace	Loads data from the inverter on a real-time basis to display with a graph. Sampling time: 1ms to 1s
		Trace back	Loads sampling data retained in the inverter at an alarm to display with a graph. Sampling time: 50μs to 1s (Note that sampling is enabled at 400μs or more except current.) Sampling data are stored into the memory using the battery power. Data stored period: 5 years or more (at ambient temperature 25°C) * Battery: built-in as standard for 30kW or higher models, available as option for up to 22kW models
		Operation monitor	I/O monitor, system monitor, alarm history monitor
		Function code setting	Function code setting states can be checked. Also edit, transfer, comparison, initialization are available.
	Charge lamp		Lit when the power is being supplied to the inverter body. Lit only with control power.
Maintenance	Main circuit capacitor life		Auto life judgment function installed
	Common functions		• Displays and records accumulated time for capacitor life and cooling fan operation time in the control power. • Displays and records inverter operation time. • Displays and records the maximum output current and the maximum internal temperature for the past one hour.
Communications	RS-485		This is a input terminal to connect computers and programmable controllers via RS-485 communications.
	USB		USB connector (Mini B type) for connection with a computer. The following operations are enabled using the inverter support loader: function code edit, transfer verification, inverter test run, and monitoring various states.
Compatibility with earlier models	VG7	Function code data	Set the VG7 function codes to activate each operation of the code (excluding the function codes for the VG7 third motor). Values read from the VG7 can be written to the FRENIC-VG without changing them by using the PC loader (except some special items).
		Communications	T-Link, SX bus, and CC-Link are fully compatible. (The host PLC software can be used without any change.) (Except some special items)
	Adaptor		An adaptor to fit the installation dimensions of earlier models is available as option.
Safety function	Standard function	Stopping function	Safe Torque Off (STO) • Stops the inverter output transistor with the hardware and cut the torque output of the motor immediately with a digital input signal (EN1 terminal or EN2 terminal) OFF which is externally input.
Product standard	Conformance to standard		US and Canada Safety Standard UL, cUL (UL508C, C22.2 No.14) (Certification being approved) European Safety Standard EN61800-5-2: SIL2 (Certification being approved) EN62061: SIL2 (Certification being approved) Machinery Directive EN ISO13849-1: PL-d (Certification being approved) EN60204-1: stop category 0 (Certification being approved) Low Voltage Directive EN61800-5-1: over voltage category 3 (Certification being approved) EMC Directive EN61800-3 (Certification being approved), EN61326-3-1 (Certification being approved) (Emission) EMC filter built-in type: category C3 EMC filter (option): category C2 (Immunity) 2nd Env.
Installation environment	Usage environment		Indoor use only. Free from corrosive and flammable gases, dusts, and oil mist (pollution degree 2 - IEC60664-1). No direct sunlight.
	Ambient temperature		-10 to +50°C (-10 to +40°C for the unit with 22 kW or less, with closely installed in lateral arrangement)
	Ambient humidity		5 to 95% RH (No dew condensation allowed)
	Altitude		1000m or less
	Vibration		200V 55kW or less, 400V 75kW or less 3mm: 2 to 9Hz or less, 9.8m/s2: 9 to 20Hz or less, 2m/s2: 20 to 55Hz or less, 1m/s2: 55 to 200Hz or less 200V 75kW or more, 400V 90kW or more 3mm: 2 to 9Hz or less, 2m/s2: 9 to 55Hz or less, 1m/s2: 55 to 200Hz or less
	Storage temperature		-25 to +70°C
	Storage humidity		5 to 95% RH (No dew condensation allowed)

Protective functions

Protective function details

Function	Item	Description	LED	
Protective function	Braking transistor error	Stops the inverter by detecting a braking transistor abnormality (only with the models to which the braking circuit is installed.) Be sure to shut off the inverter primary power when this alarm is detected.	dbA	H103
	Braking resistor overheat	Stops the inverter when the allowable value is exceeded by estimating the braking resistor temperature. Setting E35 to 37 is required depending on the used resistor.	dbH	E35~E37
	DC fuse blown	This is displayed by fusing at the main circuit DC part caused by short-circuit in the IGBT circuit or other similar reason. This function is provided to prevent the secondary accident. Since inverter damage may be suspected, contact Fuji immediately. (200V 75kW or more, 400V 90kW or more)	dCF	
	Excessive position deviation	Activated when the position deviation between the reference and the detected values exceeds the ten times of the function code o18 "Excessive deviation value" in synchronized operation.	dO	o18
	Encoder communications error	Activated when an encoder communications error is detected by using the ABS encoder with 17-bit high resolution (option card OPC-VG1-SPGT).	EC	
	Ground fault	Activated by a ground fault in the inverter output circuit. When a ground-fault current is large, the overcurrent protective function may be activated. This function is provided to protect the inverter. Connect a separate earth-leakage protective relay or an earth-leakage circuit breaker for accident prevention such as human damage and fire.	EF	H103
	Memory error	Activated when a fault such as "write error" occurs in the memory. [The number of times to write into the memory (nonvolatile memory) is limited (100,000 to 1,000,000 times). If data are written frequently with the all save function needlessly, data change and data save may be disabled, resulting in memory error.]	Er 1	
	KEYPAD communications error	Activated if a communications error is detected between the inverter control circuit and the KEYPAD when the start/stop command from the KEYPAD is valid (function code F02=0). NOTE: KEYPAD communications error does not indicate the alarm display and issue the alarm relay output when the inverter is operated by external signal input or the link function. The inverter continues operating.	Er2	F02
	CPU error	Activated when a CPU error occurs.	Er3	
	Network error	Activated if a communications error occurs due to noise when the inverter is operated through T- Link, SX bus or CC-Link. Activated also if a communications error is detected by the toggle monitoring function.	Er4	o30,o31,H107 E01~E14 E15~E28
	RS-485 communications error	Activated if an RS-485 communications error occurs when the function code H32 is set to 0 to 2 during inverter running using RS-485 communications. The function code H38 is set between 0.1 and 60.0. This function is activated if the communications circuit is disconnected exceeding the set time.	Er5	H32,H33 H36,H107
	Operation procedure error	This function is activated under the following conditions: If several pieces of network option cards (T-Link, SX bus, CC-Link, etc.) are installed. If the same setting is made to both of the switches to select the usage method though the multiple PG options can be installed. If auto tuning for H01 is started with any of the digital inputs [BX], [STOP1], [STOP2], and [STP3] turned on. If the FWD key on the KEYPAD is not pressed for 20 seconds or more after selecting the operation of auto tuning for H01.	Er6	H01
	Output wiring error	Activated when the wires are not connected in the inverter output circuit at auto tuning.	Er7	H01
	A/D converter error	Activated when an error occurs in the A/D converter circuit.	Er8	
	Speed disagreement	Activated when the deviation between the speed reference (speed setting) and the motor speed (detected speed, predicted speed) becomes excessive. Detection level and detection time can be set using the function code.	Er9	E43,E44,E45 H108
	Inter-inverter communications error	Activated if transmission error occurs during communications between inverters using the high-speed serial communications terminal block (option).	Erb	H107
	Simulated fault	A simulated alarm state can be generated by operating the KEYPAD or PC loader.	Err	H108,H142
	Encoder error	Activated when an encoder error or failure is detected by using the ABS encoder with 17-bit high resolution (option card OPC-VG1-SPGT).	Et 1	
	Input phase loss	The inverter is protected from being damaged due to input phase loss. Phase loss may not be detected when a load to be connected is light, or when the DC reactor is connected.	L in	E45
	Undervoltage	Activated if the DC link circuit voltage decreases to the undervoltage level due to a reduction in the supply voltage. The alarm output is not issued when the DC link circuit voltage decreases and the "function code F14" is set to "3 to 5". • Undervoltage detection level: 200V series: 180V DC, 400V series: 360V DC.	LU	F14

Function	Item	Description	LED	Related function code
Protective function	NTC thermistor disconnection	Activated if the thermistor circuit is disconnected when the application of NTC thermistors to corresponding motors (M1, 2, 3) is specified with the function codes P30, A31 and A131. Also activated with extreme low temperature (approx. -30°C or lower).	nrb	P30,A31,A131 H106
	Overcurrent	Cut the output if a current to the motor exceeds the inverter overcurrent specified value.	OC	
	Overheating at heat sink	Activated if the temperature of the heat sink to cool the rectifier diodes and the IGBTs increases due to cooling fan stoppage.	OH1	
	External alarm	The inverter stops on receiving the external alarm signal (THR). It is activated by a terminal signal when the control circuit terminals (THR assignment) are connected to alarm terminals of external devices such as a braking unit or a braking resistor.	OH2	E01 to E14 H106
	Inverter internal overheat	Activated if the ambient temperature of the control PC board increases due to poor ventilation of the inverter.	OH3	
	Motor overheat	Activated if the detected temperature of the built-in NTC thermistor for motor temperature detection exceeds the data of the "function code E30 Motor overheat protection".	OH4	E30,H106
	Motor 1 overload	Activated when the motor 1 current (inverter output current) exceeds the operation level set by "function code F11".	OL1	F11,H106
	Motor 2 overload	Activated when the motor 2 current (inverter output current) exceeds the operation level set by "function code A33".	OL2	A33,H106
	Motor 3 overload	Activated when the motor 3 current (inverter output current) exceeds the operation level set by "function code A133".	OL3	A133,H106
	Inverter unit overload	Activated if the output current exceeds the overload characteristic of the inverse time characteristic.The inverter is stopped according to the temperatures of the inverter cooling unit and of the switching element that is calculated from the output current.	OLU	F80
	Output phase detection	Stops the inverter by detecting a phase loss of the output wiring in operation.	OPL	H103
	Overspeed	Activated if the motor speed (detected speed value/predicted speed value) exceeds 120% (can be changed with H90) of the specified value by the function code "maximum speed".	OS	H90
	Overvoltage	Activated if the DC link circuit voltage exceeds the overvoltage level due to an increase of supply voltage or regenerative braking current from the motor. However, the inverter cannot be protected from excessive voltage (high voltage, for example) supplied by mistake. • Overvoltage detection level 200V series: 405V DC, 400V series: 820V DC	OU	
	PG error	Activated when the encoder terminal PA/PB circuits are disconnected. It is not activated when the sensorless control or the V/f control is selected.	PG	H104
	Charging circuit error	Activated if the bypass circuit of the DC link circuit is not formed (the magnetic contactor for the charging circuit bypass is not closed) after power is supplied. (200V 37kW or more, 400V 75kW or more)	PbF	
	DC fan lock	Activated when the DC fan is stopped. (200V 45kW or more, 400V 75kW or more)	dFA	H108
	Hardware error	Stops the inverter by detecting the LSI error on the PCB.	ErH	
	Minor fault (warning)	When an alarm and warning content registered as a minor fault occur, the minor fault indication [L-AL] is displayed on the KEYPAD. For a minor fault, the minor fault output (Y terminal) is output. However, alarm relay output (30ABC) is not output and the inverter continues operating. Items to be set (can be selected individually): Motor overheat (OH4), motor overload (OL1-OL3), NTC thermister disconnection (nrb), external alarm (OH2), RS-485 communications(Er5), option communications error (Er4), inverter link error (Er6), simulated fault (Err), DC fan lock detection (dFA), speed disagreement (Er9), motor overheat early warning, motor overload early warning, lifetime alarm, fin overheat early warning, overheating at heat sink, inverter overload early warning, battery life The cause for each minor fault can be checked on the KEYPAD.	L-AL	H106 to H108 H110,H111
	Surge protection	Protects the inverter from surge voltage coming from the power source using the surge absorber which is connected to the main circuit power source terminal (L1/R, L2/S, L3/T) and the control power source terminal (Ro, To) circuit.	—	
	Main power off detection	Monitors the inverter AC input power to judge if the AC input power (main power) is established or not. If not, whether the inverter is to be operated or not can be selected. (When the power is supplied via PWM converter or DC bus connection, do not change the setting of the function code H76 as no AC input exists.)	—	H76

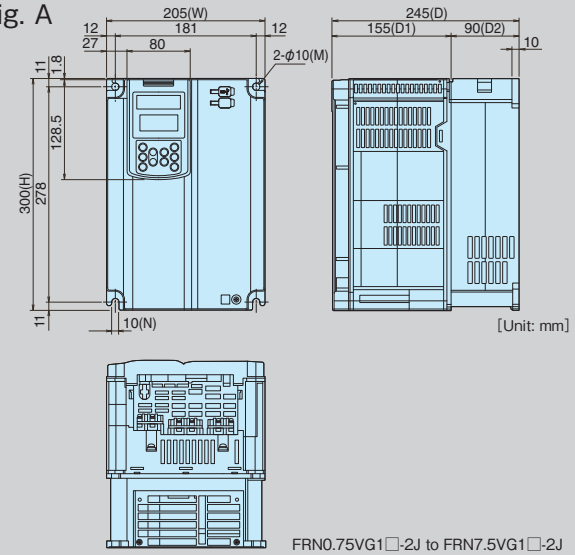
NOTES:
- All protective functions are reset automatically if the control power voltage decreases to where maintaining the operation of the inverter control circuit is impossible.
- The latest and last ten pieces of alarm codes and the latest and the last three pieces of alarm detailed data are stored.
- Stoppage due to a protective function can be reset by the RST key of the KEYPAD or turning OFF and then ON between the X terminal (RST assigning) and the CM. This action is invalid if the cause of an alarm is not found and resolved.(The cause of the alarm that has not been released can be checked on the KEYPAD.)
- The alarm may not be output when allocated to minor faults.

External Dimensions

External Dimensions

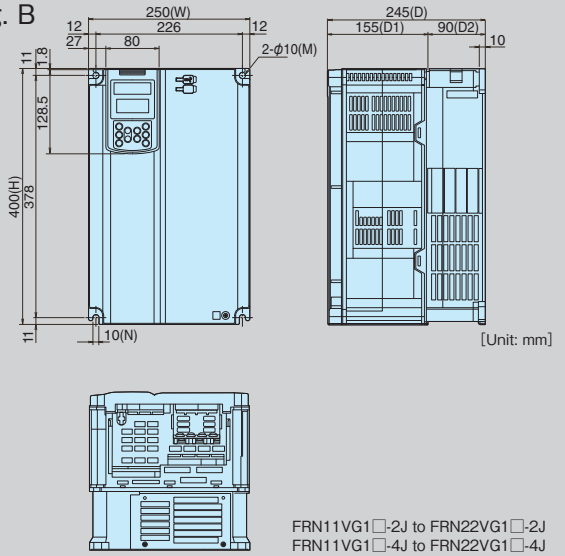
Inverter body

Fig. A



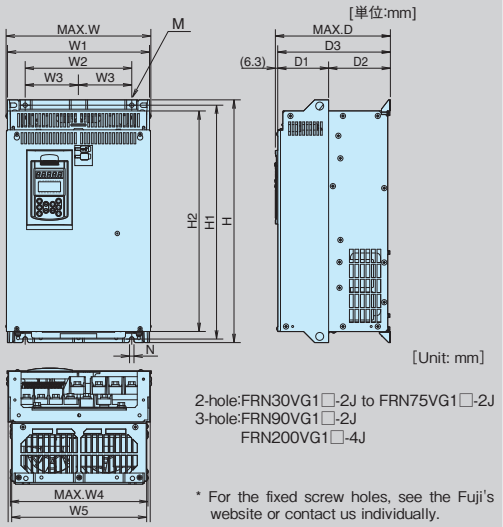
FRN0.75VG1□-2J to FRN7.5VG1□-2J

Fig. B



FRN11VG1□-2J to FRN22VG1□-2J
FRN11VG1□-4J to FRN22VG1□-4J

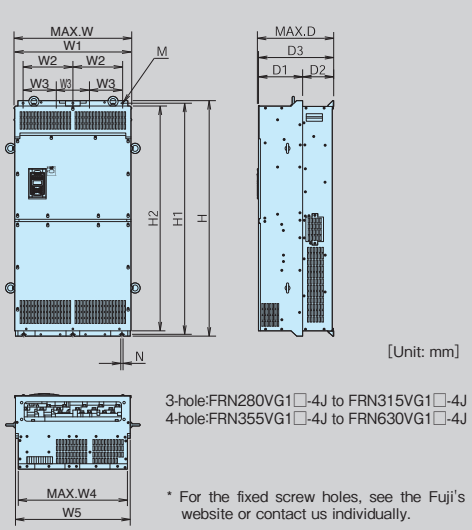
Fig. C



2-hole:FRN30VG1□-2J to FRN75VG1□-2J
3-hole:FRN90VG1□-2J
FRN200VG1□-4J

* For the fixed screw holes, see the Fuji's website or contact us individually.

Fig. D

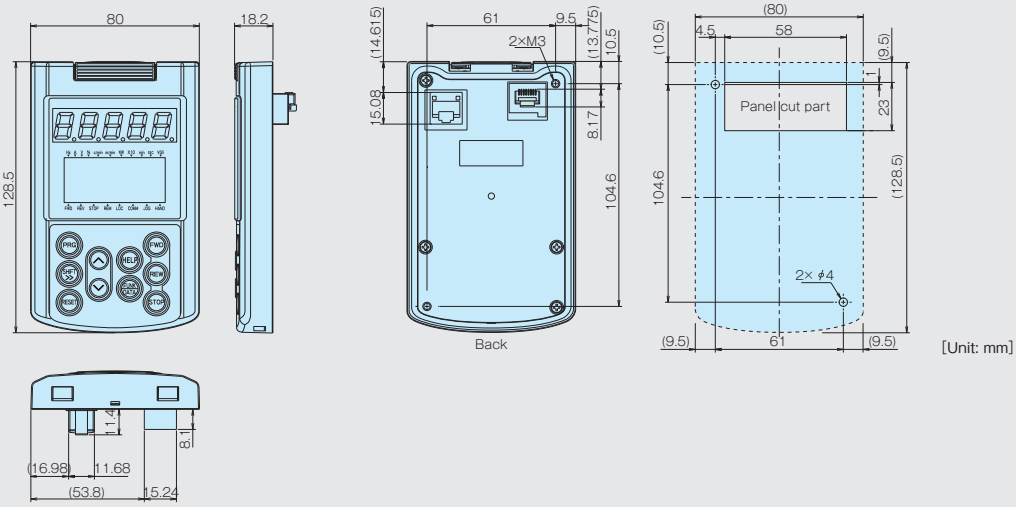


3-hole:FRN280VG1□-4J to FRN315VG1□-4J
4-hole:FRN355VG1□-4J to FRN630VG1□-4J

* For the fixed screw holes, see the Fuji's website or contact us individually.

For individual external diagrams, refer to the Fuji's site. (http://www.fujielectric.co.jp/products/inverter/download/)

KEYPAD



External Dimensions

(Unit: mm)

Series	Inverter type	図	Body external dimensions														
			W	W1	W2	W3	W4	W5	H	H1	H2	D	D1	D2	D3	M	N
3-phase 200V	FRN0.75VG1□-2J	A	205	-	-	-	-	-	300	-	-	245	155	90	-	2Xϕ10	10
	FRN1.5VG1□-2J	A															
	FRN2.2VG1□-2J	A															
	FRN3.7VG1□-2J	A															
	FRN5.5VG1□-2J	A															
	FRN7.5VG1□-2J	A															
	FRN11VG1□-2J	B	250						400								
	FRN15VG1□-2J	B															
	FRN18.5VG1□-2J	B															
	FRN22VG1□-2J	B															
	FRN30VG1□-2J	C	326.2	320	240		310.2	304	550	530	500	261.3	115	140	255		
	FRN37VG1□-2J	C	361.2	355	275		345.2	339	615	595	565	276.3		155	270		
	FRN45VG1□-2J	C							740	720	690						
	FRN55VG1□-2J	C															
	FRN75VG1□-2J	C	535.8	530	430		506.4	500.6	750		688.7	291.3	145	140	285	2Xϕ15	15
	FRN90VG1□-2J	C	686.4	680	-	290	656.4	650.6	880	850	819.5	366.3	180	180	360	3Xϕ15	
3-phase 400V	FRN3.7VG1□-4J	A	205	-	-	-	-	-	300	-	-	245	155	90	-	2Xϕ10	10
	FRN5.5VG1□-4J	A															
	FRN7.5VG1□-4J	A															
	FRN11VG1□-4J	B	250						400								
	FRN15VG1□-4J	B															
	FRN18.5VG1□-4J	B															
	FRN22VG1□-4J	B															
	FRN30VG1□-4J	C	326.2	320	240	-	310.2	304	550	530	500	261.3	115	140	255		
	FRN37VG1□-4J	C															
	FRN45VG1□-4J	C	361.2	355	275		345.2	339	615	595	565	276.3		155	270		
	FRN55VG1□-4J	C							675	655	625						
	FRN75VG1□-4J	C							740	720	690						
	FRN90VG1□-4J	C	536.4	530	430		506.4	500.6		710	678.7	321.3	135	180	315	2Xϕ15	15
	FRN110VG1□-4J	C															
	FRN132VG1□-4J	C							1000	970	939.5	366.3	180		360		
	FRN160VG1□-4J	C															
	FRN200VG1□-4J	C	686.4	680	-	290	656.4	650.6								3Xϕ15	
	FRN220VG1□-4J	C															
	FRN280VG1□-4J	D			290	-	659	653	1400	1370	1330	445.5	260		440		
	FRN315VG1□-4J	D															
	FRN355VG1□-4J	D	886.4	880	-	260	859.1	853				446.3				4Xϕ15	
	FRN400VG1□-4J	D															
	FRN500VG1□-4J	D	1006	1000		300	972	966	1550	1520	1480	505.9	313.2	186.8	500		
	FRN630VG1□-4J	D															

□:S:Standard type

Dedicated motor Specifications (Induction motor with sensor)

3-phase 200V series standard specification

Item		Specifications															
Dedicated motor rated output [kW]		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Applicable motor type (MVK_)		8095A	8097A	8107A	8115A	8133A	8135A	8165A	8167A	8184A	8185A	8187A	8207A	8208A	9224A	9254A	9256A
Moment of inertia of rotor [kg·m²]		0.009	0.009	0.009	0.016	0.030	0.037	0.085	0.11	0.21	0.23	0.34	0.41	0.47	0.53	0.88	1.03
Rotor GD² [kgf·m²]		0.036	0.036	0.036	0.065	0.12	0.15	0.34	0.47	0.83	0.92	1.34	1.65	1.87	2.12	3.52	4.12
Base speed/Max. speed [r/min]		1500/3600										1500/3000			1500/2400		1500/2000
Vibration		V10 or less													V15 or less		
Cooling fan	Voltage [V], frequency [Hz]	-	200 to 210V/50Hz,200 to 230/60Hz												200V/50Hz, 200,220V/60Hz		
	Number of phases/poles	-	Single phase, 4P					3-phase, 4P									
	Input power [W]	-	40/50					90/120		150/210					80/120	270/390	
	Current [A]	-	0.29/0.27 to 0.31					0.49/ 0.44 to 0.48		0.75/0.77 to 0.8					0.76/ 0.8.0.8	1.9/2.0,2.0	
Approx. weight [kg]		28	29	32	46	63	73	111	133	190	197	235	280	296	380	510	570

* Only MVK8095A (0.75kW) is of natural air cooling type.

3-phase 400V series standard specification

Item		Specifications																	
Dedicated motor rated output [kW]		3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220
Applicable motor type (MVK_)		8115A	8133A	8135A	8165A	8167A	8184A	8185A	8187A	8207A	8208A	9224A	9254A	9256A	9284A	9286A	528KA	528LA	531FA
Moment of inertia of rotor [kg·m²]		0.016	0.030	0.037	0.085	0.11	0.21	0.23	0.34	0.41	0.47	0.53	0.88	1.03	1.54	1.77	1.72	1.83	2.33
Rotor GD² [kgf·m²]		0.065	0.12	0.15	0.34	0.47	0.83	0.92	1.34	1.65	1.87	2.12	3.52	4.12	6.16	7.08	6.88	7.32	9.32
Base speed/Max. speed [r/min]		1500/3600							1500/3000			1500/2400		1500/2000					
Vibration		V10 or less										V15 or less							
Cooling fan	Voltage [V], frequency [Hz]	200 to 210V/50Hz, 200 to 230V/60Hz			400 to 420V/50Hz,400 to 440V/60Hz							400V/50Hz,400,440V/60Hz							
	Number of phases/poles	Single phase, 4P			3-phase, 4P														
	Input power [W]	40/50			90/120		150/210					80/ 120	270/390				2200		3700
	Current [A]	0.29/0.27 to 0.31			0.27/ 0.24 to 0.25		0.38/0.39 to 0.4					0.39/ 0.4,0.4	1.0/1.0,10				4.6/4.3,4.1		7.8/ 7.1,7.6
Approx. weight [kg]		46	63	73	111	133	190	197	235	280	296	380	510	570	710	760	1270	1310	1630

3-phase 400V series standard specification

Item		Specifications					
Dedicated motor rated output [kW]		250	280	300	315	355	400
Applicable motor type (MVK_)		531GA	531HA	535GA	535GA	535HA	535JA
Moment of inertia of rotor [kg·m²]		2.52	2.76	5.99	5.99	6.53	7.18
Rotor GD² [kgf·m²]		10.08	11.04	23.96	23.96	26.12	28.72
Base speed/Max. speed [r/min]		1500/2000					
Vibration		V15 or less					
Cooling fan	Voltage [V], frequency [Hz]	400V/50Hz,400,440V/60Hz					
	Number of phases/poles	3-phase, 4P					
	Input power [W]	3700					
	Current [A]	7.8/7.1,7.6					
Approx. weight [kg]		1685	1745	2230	2230	2310	2420

Common specifications

Item	Specifications
Insulation class/Number of poles	Class F/4P
Terminal design	Main terminal box (lug type): 3 or 6 main circuit terminals, NTC thermistor terminals = 2 (MVK8 series), 3 (MVK9 series, 1 is reserved) Auxiliary terminal box (terminal block): Pulse generator (PGP, PGM, PA, PB, SS), cooling fan (FU, FV or FU, FV, FW)
Mounting method	Foot mounted with bracket (IMB3), NOTE: Contact FUJI for other methods.
Degree of protection, Cooling method	IP44, Totally enclosed forced-ventilation system with cooling fan motor.A cooling fan blows air over the motor toward the drive-end. (* Only MVK8095A (0.75kW) is of natural air cooling type.)
Installation location	Indoor, 1000m or less in altitude.
Ambient temperature, humidity	-10 to +40°C, 90%RH or less (no condensation)
Finishing color	Munsell N5
Standard conformity	MVK8 series: JEM1466 or JEC-2137-2000, MVK9 series, MVK5 series: JEC-2137-2000
Standard accessories	Pulse generator (1024P/R, +15V, complementary output), NTC thermistors (1 or 2 units), cooling fan (except for MVK8095A).

(Note1) The torque accuracy is ±5% for applicable motors with 55kW or more. When further accuracy is required, contact Fuji.
(Note2) When a dedicated motor other than the motor with 4-pole and with base speed 1500r/min is necessary, inquire separately.

External dimensions of dedicated motors (Induction motor with sensor)

MVK

Fig. A

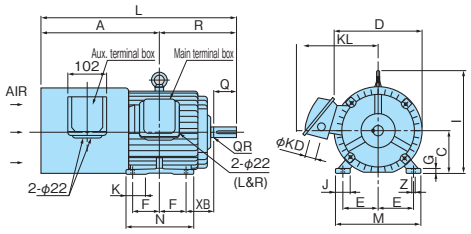
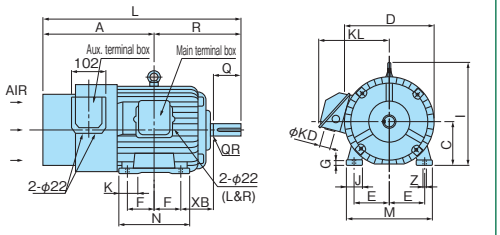


Fig. B



Shaft extension

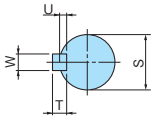


Fig. C

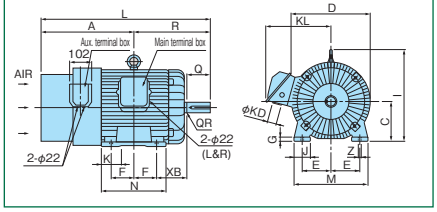


Fig. D

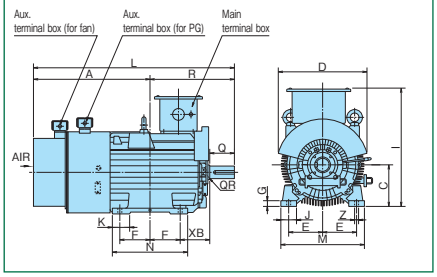
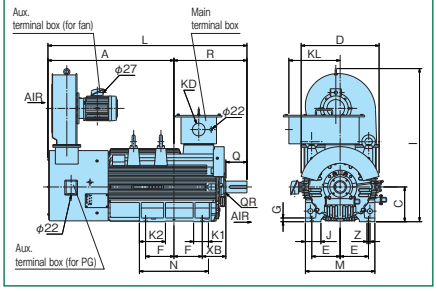


Fig. E



[Unit:mm]

Motor rated output [kW]	Motor type	Fig.	Dimensions																			Shaft extension						Approx. weight [kg]
			A	C	D	E	F	G	I	J	K	K1	K2	KD	KL	L	M	N	R	XB	Z	Q	QR	S	T	U	W	
0.75	MVK8095A	A	201.5	90	204	70	62.5	10	195	35.5	35.5	-	-	27	189	370	170	150	168.5	56	10	50	0.5	24j6	7	4	8	28
1.5	MVK8097A		277.5		203											446												29
2.2	MVK8107A		292	100		80	70	12.5	238	40	40				190	485	195	170	193	63	12	60		28j6				32
3.7	MVK8115A		299	112	236	95		14	270		50				205	499	224	175	200	70								46
5.5	MVK8113A	B	309	132	273	108		17	311	45				34	223	548	250	180	239	89		80		38k6	8	5	10	63
7.5	MVK8135A		328				89									586		212	258									73
11	MVK8165A	A	400	160	321	127	105	18	376	50	63			48	272	723	300	250	323	108	14.5	110	1	42k6			12	111
15	MVK8167A		422				127									767		300	345									133
18.5	MVK8184A		435	180	376	139.5	120.5	20	428	75	75				305	786.5	350	292	351.5	121			1.5	48k6	9	5.5	14	190
22	MVK8185A																											197
30	MVK8187A		454				139.5							60		824.5		330	370.5					55m6	10	6	16	235
37	MVK8207A	C	490	200	411	159	152.5	25	466	80	85			80	364	915.5	390	360	425.5	133	18.5	140	2	60m6	11	7	18	280
45	MVK8208A																											296
55	MVK9224A		723	225	445	178	143		515		95				391	1155	436	366	432	149				65m6				380
75	MVK9254A	D	693.5	250	545	203	155.5	30	743	100	120				106	1157	506	411	463.5	168	24			75m6	12	7.5	20	510
90	MVK9256A		711.5				174.5									1194		449	483.5									570
110	MVK9284A		764	280	605	228.5	184	35	798						203	1308	557	468	544	190		170		85m6	14	9	22	710
132	MVK9286A		789.5				209.5									1359		519	569.5									760
160	MVK528JA	E	1015.5		628		228.5	30	1234	125	-	120	210	102	413	1604	560	557	588.5				1					1230
200	MVK528LA															1350												
220	MVK531FA		1073	315	689	254	254	36	1425	150		140	240			1713	630	648	640	216	28	210	2	95m6	16	10	25	1690
250	MVK531GA																											1750
280	MVK531HA																											1820
300	MVK535GA		1111	355	778	305	355		1510	160		180	330			1956	730	890	845	280				100m6			28	2230
315																												
355	MVK535HA																											2310
400	MVK535JA																											2420

(Note 1) MVK8095A (0.75kW) is of natural cooling type (cooling system: IC410). (Note 2) MVK8095A (0.75kW) has the cable lead-in hole of φ22 (in 1 place).
(Note 3) MVK9224A (55kW) has an auxiliary terminal box for fan shown in Fig. C.
(Note 4) Allowable tolerance of dimension: Hight of rotary shaft C≦250mm····· $-^{0}_{0.5}$ mm,C>250mm····· $-^{0}_{1.0}$ mm

Dedicated motor Specifications (Synchronous motor with sensor)

3-phase 200V series standard specification

Item		Specifications											
Dedicated motor rated output [kW]		5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Applicable motor type (GNF_)		2114A	2115A	2117A	2118A	2136A	2137A	2139A	2165A	2167A	2185A	2187A	2207A
Moment of inertia of rotor [kg·m²]		0.018	0.021	0.027	0.036	0.065	0.070	0.090	0.153	0.191	0.350	0.467	0.805
Rotor GD² [kgf·m²]		0.072	0.084	0.107	0.143	0.259	0.281	0.360	0.610	0.763	1.401	1.868	3.220
Base speed/Max. speed [r/min]		1500/2000											
Rated current [A]		20/20	29/29	42/42	57/57	71/70	82/81	113/108	144/144	165/165	200/200	270/270	316/316
Vibration		V10 or less											
Cooling fan	Voltage [V], frequency [Hz]	200 to 240,50/60							200 to 210/50,200 to 230/60				
	Number of phases/poles	3-phase,2P							3-phase,4P				
	Input power [W]	38 to 44/56 to 58				54 to 58/70 to 78			90/120		150/210		
	Current [A]	0.13 to 0.16/0.18 to 0.16				0.18 to 0.18/0.22 to 0.21			0.49/0.44 to 0.48		0.75/0.77 to 0.8		
Approx. weight [kg]		51	55	69	78	100	106	127	170	192	247	325	420

3-phase 400V series standard specification

Item		Specifications											
Dedicated motor rated output [kW]		5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Applicable motor type (GNF_)		2114A	2115A	2117A	2118A	2136A	2137A	2139A	2165A	2167A	2185A	2187A	2207A
Moment of inertia of rotor [kg·m²]		0.018	0.021	0.027	0.036	0.065	0.070	0.090	0.153	0.191	0.350	0.467	0.805
Rotor GD² [kgf·m²]		0.072	0.084	0.107	0.143	0.259	0.281	0.360	0.610	0.763	1.401	1.868	3.220
Base speed/Max. speed [r/min]		1500/2000											
Rated current [A]		10/10	15/15	21/21	29/29	36/35	41/41	57/54	72/72	83/83	100/100	135/135	158/158
Vibration		V10 or less											
Cooling fan	Voltage [V], frequency [Hz]	200 to 240,50/60							400 to 420/50,400 to 440/60				
	Number of phases/poles	3-phase, 2P							3-phase, 4P				
	Input power [W]	38 to 44/56 to 58				54 to 58/70 to 78			90/120		150/210		
	Current [A]	0.13 to 0.16/0.18 to 0.16				0.18 to 0.18/0.22 to 0.21			0.27/0.24 to 0.25		0.38/0.39 to 0.4		
Approx. weight [kg]		51	55	69	78	100	106	127	170	192	247	325	420

3-phase 400V series standard specification

Item		Specifications							
Dedicated motor rated output [kW]		110	132	160	200	220	250	280	300
Applicable motor type (GNF_)		2224B	2226B	2254B	2256B	2284B	2284B	2286B	2286B
Moment of inertia of rotor [kg·m²]		0.882	0.994	1.96	2.22	2.89		3.24	
Rotor GD² [kgf·m²]		3.53	3.98	7.84	8.88	11.6		13.0	
Base speed/Max. speed [r/min]		1500/2000							
Rated current [A]		198	232	273	340	369	420	480	520
Vibration		V10 or less							
Cooling fan	Voltage [V]	380,400,415/400,415,440,460							
	Number of phases/poles	3-phase, 4P							
	frequency [Hz]	50/60							
	Input power [W]	80/120		270/390					
	Current [A]	0.36,0.38,0.41/0.4,0.4,0.4,0.4		0.95,0.95,1/1,1,1,1					
Approx. weight [kg]		520	580	760	810	1020		1080	

Common specifications

Item	Specifications
Insulation class/Number of poles	Class F/6P
Terminal design	Main terminal box (lug type): 3 or 6 main circuit terminals NTC thermister terminals = 2 pcs(1 pc is a spare), 110kW or more Auxiliary terminal box (terminal block): cooling fan (FU, FV, FW) Pulse encoder (connector type), cooling fan (FU, FV, FW)
Rotation direction	CCW direction when viewed from operator
Mounting method	Legs mounted (IMB3) NOTE: Contact FUJI for other methods.
Overload resistance	150% 1min.
Time rating	S1
Degree of protection, Cooling method	IP44, Totally enclosed forced-ventilation system with cooling fan motor.A cooling fan blows air over the motor toward the drive-end.
Installation location	Indoor, 1000m or less in altitude.
Ambient temperature, humidity	-10 to +40°C, 90%RH or less (no condensation)
Noise	5.5kW to 90kW:80dB(A) or less at1m,110kW to 300kW:90dB(A) or less at1m
Vibration resistance	6.86m/s² (0.7G)
Finishing color	Munsell N1.2
Standard conformity	JEM 1487:2005
Standard built-in part	Pulse encoder (1024P/R, DC+5V, A ,B ,Z, U, V, W line driver output), NTC thermister 1 pc (2 pcs for 110kW or more), cooling fan

External dimensions of dedicated motors (Synchronous motor with sensor)

GNF2

Shaft extension

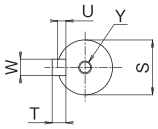


Fig. A

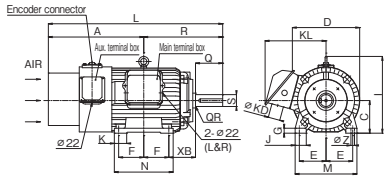


Fig. B

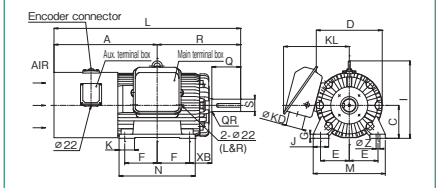


Fig. C

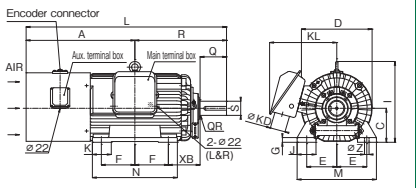


Fig. D

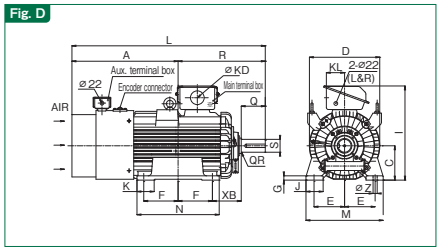


Fig. E

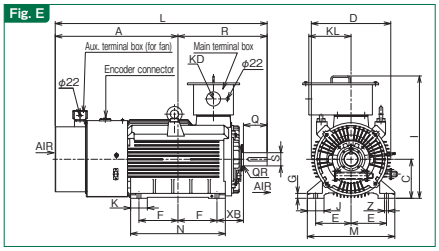
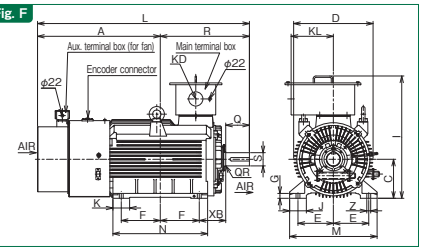


Fig. F



[Unit:mm]

Motor rated output [kW]	Motor type	Flame no.	Fig.	Dimensions																	Shaft extension							Approx. weight [kg]
				A	C	D	E	F	G	I	J	K	KD	KL	L	M	N	R	XB	Z	Q	QR	S	T	U	W	Y	
5.5	GNF2114A	112Mh	A	335.5	112	235	95	70	14	270	40	50	34	200	555.5	224	175	220	70	12	80	0.5	38k6	8	5	10	M10X20	51
7.5	GNF2115A			335.5	112	235	95	70	14	270	40	50	34	200	555.5	224	175	220	70	12	80	0.5	38k6	8	5	10	M10X20	55
11	GNF2117A	112Jh		380.5	112	235	95	100	18	270	55	50	48	235	698.5	228	238	318	108	14.5	110	1	42k6	8	5	12	M10X20	69
15	GNF2118A			380.5	112	235	95	100	18	270	55	50	48	235	698.5	228	238	318	108	14.5	110	1	42k6	8	5	12	M10X20	78
18.5	GNF2136A	132Lh		386	132	272	108	101.5	20	311	45	50	48	247	705.5	250	238	319.5	108	14.5	110	1.5	48k6	9	5.5	14	M10X20	100
22	GNF2137A			386	132	272	108	101.5	20	311	45	50	48	247	705.5	250	238	319.5	108	14.5	110	1.5	48k6	9	5.5	14	M10X20	106
30	GNF2139A	132Hh		424.5	132	272	108	140	20	311	45	50	60	247	782.5	250	313	358	108	14.5	110	1.5	55m6	10	6	16	M10X20	127
37	GNF2165A	160Lg	B	470.5	160	319	139.5	127	20	376	75	75	80	320	845.5	350	300	375	108	18.5	140	2	60m6	11	7	18	M12X25	170
45	GNF2167A	160Jg		501	160	319	139.5	157.5	20	376	75	75	80	320	906.5	350	370	405.5	108	18.5	140	2	60m6	11	7	18	M12X25	192
55	GNF2185A	180Lg		510	180	375	159	139.5	25	428	80	85	80	356	910.5	390	330	400.5	121	18.5	140	2	65m6	11	7	18	M12X25	247
75	GNF2187A	180Jg	C	576	180	375	159	177.5	25	428	100	100	80	356	1061.5	420	450	485.5	168	24	140	2	75m6	12	7.5	20	M12X25	325
90	GNF2207A	200Jg	D	618.5	200	410	178	200	25	549	100	100	80	107	1126.5	450	479	508	168	24	140	2	75m6	12	7.5	20	M12X25	420
110	GNF2224B	225Kg		711	225	446	203	200	28	628	100	120	80	142	1249	506	526	538	168	24	170	1	85m6	14	9	22	M20X35	520
132	GNF2226B	225Hg		761	225	446	203	250	28	628	100	120	80	142	1349	506	626	588	168	24	170	1	85m6	14	9	22	M20X35	580
160	GNF2254B	250Hg	E	829	250	508	228.5	280	32	763	100	120	80	203	1469	557	677	640	190	24	170	1	95m6	14	9	25	M20X35	760
200	GNF2256B			829	250	505	228.5	280	32	763	100	120	80	203	1469	557	677	640	190	24	170	1	95m6	14	9	25	M20X35	810
220	GNF2284B	280Jf	F	881	280	570	254	280	35	878	120	120	102	303	1521	628	680	640	190	28	170	1	95m6	14	9	25	M20X35	1020
250	GNF2284B			881	280	570	254	280	35	878	120	120	102	303	1521	628	680	640	190	28	170	1	95m6	14	9	25	M20X35	1020
280	GNF2286B			881	280	570	254	280	35	878	120	120	102	303	1521	628	680	640	190	28	170	1	95m6	14	9	25	M20X35	1080
300	GNF2286B			881	280	570	254	280	35	878	120	120	102	303	1521	628	680	640	190	28	170	1	95m6	14	9	25	M20X35	1080

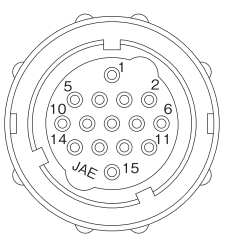
(Note 1) The models with 110kW or more are designed to be connected directly. If not to be connected directly, contact us.
(Note 2) Allowable tolerance of dimension: Hight of rotary shaft C≦250mm…… $_{-0.5}^{0}$ mm,C>250mm…… $_{-1.0}^{0}$ mm

Connector specifications for encoder connection [Manufacturer: Japan Aviation Electronics]

Motor type	Receptacle installed to motor	Items prepared by customer	
		Straight plug	Angle plug
	Type	Type	Type
GNF2 type	JN2AW15PL1 (15P receptacle)	JN2DW15SL1 (15P straight plug)	JN2FW15SL1 (15P angle plug)
	Terminal of receptacle installed to motor	Recommended terminal (solder connection)	
	Type	Terminal type (Note2)	Max applicable cable size
	JN1-22-26P (Crimp type pin)	JN1-22-22F-PKG100	AWG20 (Jacketed OD: ϕ1.5 mm or less)

Terminal arrangement diagram

Connector NO. arrangement diagram on plug side



Connector NO.	Symbols on plate	Encoder signal
1	+5V	DC+5V
2	0V	0V
3	A	A
4	$\overline{A}$	Anot
5	B	B
6	$\overline{B}$	Bnot
7	Z	Z
8	$\overline{Z}$	Znot
9	U	U
10	$\overline{U}$	Unot
11	V	V
12	$\overline{V}$	Vnot
13	W	W
14	$\overline{W}$	Wnot
15	—	—

(Note1) The Following PG shield cable is recommended.

Kind	Braided shield cable (twisted pair cable, cable OD: approx.ϕ10)
No. of cores	14 cores or more
Diameter	0.2mm² to 0.3mm²
Jacketed OD	ϕ1.5 or less

(Note2) The PKG of contact terminal type is in bulk by 100 pieces.
(Note3) Connect the contact terminal by soldering.
(Note4) Contact Fuji if preparing the item mentioned above is difficult. They are available as options. (Specify the plug type and cable length.)

Terminal Functions

Main circuit and analog input terminal

Item	Symbol	Terminal name	Function
Main circuit	L1/R,L2/S,L3/T	Power input	Connects a 3-phase power supply.
	U,V,W	Inverter output	Connects a 3-phase motor.
	P (+),P1	For DC REACTOR	Connects a DC REACTOR. A DC REACTOR is optional for 55kW or less and standard for 75kW or more.
	P (+),N (-)	For BRAKING UNIT	Connects a braking resistor via the braking unit. Used for a DC bus connection system.
	P (+),DB	For EXTERNAL BRAKING RESISTOR	Connects an external braking resistor (optional).
	⏚ G	Grounding	Ground terminal for inverter chassis.
	R0,T0	Auxiliary control power supply	Connects the same AC power supply as that of the main circuit to back up the control circuit power supply.
	R1,T1	Auxiliary input for fan power	Used as a power input for the AC cooling fan inside the inverter to combine with the high factor PWM converter with power regenerative function (on the models of 200V series 37Kw or more, 400V series 75kW or more). Generally this is not necessary as long as the inverter is used individually.
Speed setting	13	Potentiometer power supply	Used for power supply for a speed setting POT (variable resistor: 1 to 5kΩ). 10V DC 10mA Max.
	12	Voltage input for speed setting	Used for analog reference voltage input. • Reversible operation can be selected by ±signals: 0 to +10V DC /0 to max. speed.
	11	Analog input common	Common terminal to input signals.
Analog input	Ai1	Analog input 1	The following functions can be selected and set according to the external analog input voltage. 0: Input signal off [OFF] 1: Auxiliary speed setting 1 [AUX-N1] 2: Auxiliary speed setting 2 [AUX-N2] 3: Torque limiter (level 1) [TL-REF1] 4: Torque limiter (level 2) [TL-REF2] 5: Torque bias reference [TB-REF] 6: Torque reference [T-REF] 7: Torque current reference [IT-REF] 8: Creep speed 1 in UP/DOWN setting [CRP-N1] 9: Creep speed 2 in UP/DOWN setting [CRP-N2] 10: Magnetic-flux reference [MF-REF] 11: Detected speed [LINE-N] 12: Motor temperature [M-TMP] 13: Speed override [N-OR] 14: Universal Ai [U-AI] 15: PID feedback value [PID-FB1] 16: PID reference value [PID-REF] 17: PID correction gain [PID-G] 18-24: Custom Ai1 to 7 [C-AI 1 to 7] 25: Speed main setting [N-REFV] 26: Current input speed setting [N-REFC]
	Ai2	Analog input 2	Ai2 can be switched between voltage and current inputs by setting the internal switch. However, the current input can apply to only the speed setting.
	M	Analog input common	Common terminal to analog input signals.

Digital input terminal

Items			Function
Digital input (Sink/source selection possible)	FWD	Forward operation command	FWD - CM: ON... The motor runs in the forward direction. FWD - CM: OFF...The motor decelerates and stops.
	REV	Reverse operation command	REV - CM: ON... The motor runs in the reverse direction. REV - CM: OFF...The motor decelerates and stops.
	X1	Digital input 1	0, 1, 2, 3: Multistep speed selection (step 1 to 15) [0: SS1, 1: SS2, 2: SS4, 3: SS8] 4, 5: ASR, ACC/DEC time selection (4 steps) [4: RT1, 5: RT2] 6: 3-wire operation stop command [HLD] 7: Coast-to-stop command [BX] 8: Alarm reset [RST] 9: Trip command (External fault) [THR] 10: Jogging operation [JOG] 11: Speed setting N2/Speed setting N1 [N2/N1] 12: Motor M2 selection [M-CH2] 13: Motor M3 selection [M-CH3] 14: DC brake command [DCBRK] 15: ACC/DEC cleared to zero [CLR] 16: Creep speed switching in UP/DOWN setting [CRP-N2/N1] 17: UP command in UP/DOWN setting [UP] 18: DOWN command in UP/DOWN setting [DOWN] 19: Write enable for KYEPAD (data can be changed) [WE-KP] 20: PID control cancel [KP/PID] 21: Inverse mode change over [IVS] 22: Interlock signal for 52-2 [IL] 23: Write enable through link [WE-LK] 24: Operation selection through link [LE] 25: Universal DI [U-DI] 26: Pick up start mode [STM] 27: Synchronization command [SYC] 28: Zero speed locking command [LOCK] 29: Pre-exciting command [EXITE] 30: Speed reference cancel [N-LIM] 31: H41 (torque reference) cancel [H41-CCL] 32: H42 (torque current reference) cancel [H42-CCL] 33: H43 (magnetic-flux reference) cancel [H43-CCL] 34: F40 (torque limiter mode 1) cancel [F40-CCL] 35: Torque limiter (level1, lecel2 selection) [TL2/TL1] 36: Bypass [BPS] 37, 38: Torque bias reference 1/2 [37:TB1, 38:TB2] 39: Droop selection [DROOP] 40: Ai1 zero hold [ZH-AI1] 41: Ai2 zero hold [ZH-AI2] 42: Ai3 zero hold [ZH-AI3] 43: Ai4 zero hold [ZH-AI4] 44: Ai1 polarity change [REV-AI1] 45: Ai2 polarity change [REV-AI2] 46: Ai3 polarity change [REV-AI3] 47: Ai4 polarity change [REV-AI4] 48: PID output inverse changeover [PID-INV] 49: PG alarm cancel [PG-CCL] 50: Undervoltage cancel [LU-CCL] 51: Ai torque bias hold [H-TB] 52: STOP1 (The motor stops with standard deceleration time) [SOPT1] 53: STOP2 (The motor decelerates and stops with deceleration time 4) [STOP2] 54: STOP3 (The motor stops with torque limiter) [STOP3] 55: DIA card enable [DIA] 56: DIB card enable [DIB] 57: Multi-winding motor control cancel [MT-CCL] 58-67: Custom Di 1 to 10 [C-DI 1 to 10] 68: Load adaptive parameter selection [AN-P2/1] 69: PID clear [PID-CCL] 70: PIDFF term effective [PID-FF] 71: Speed limit calculation completion reset signal [NL-RST] 74: Simulated external minor fault [FTB] 75:NTC thermistor alarm cancel [NTC-CCL] 76: Lifetime early warning cancel [LF-CCL]
	X2	Digital input 2	
	X3	Digital input 3	
	X4	Digital input 4	
	X5	Digital input 5	
	X6	Digital input 6	
	X7	Digital input 7	
	X8	Digital input 8	
	X9	Digital input 9	

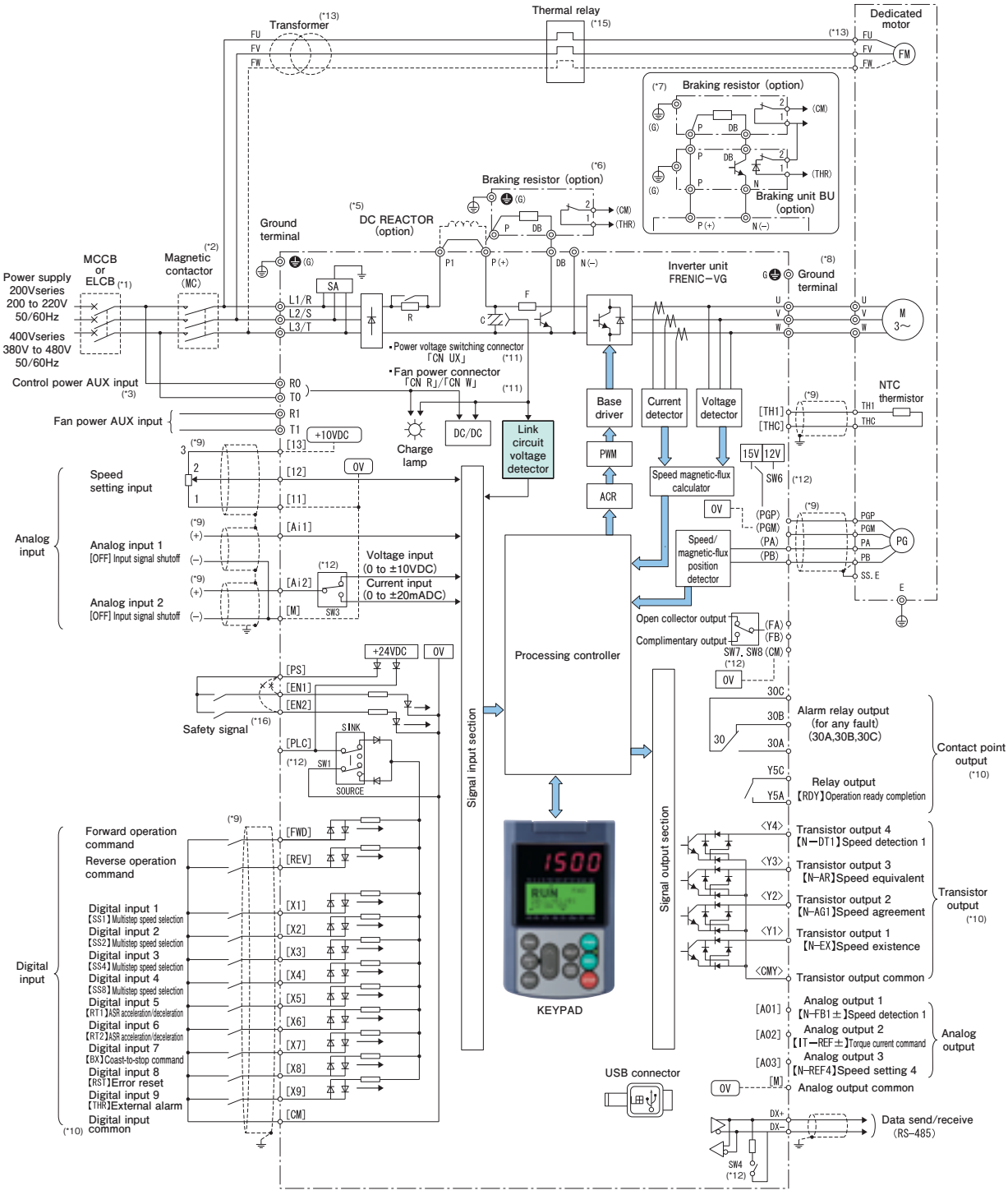
Items			Function
	PLC	PLC signal power supply	Connects to the PLC output signal power supply. This can be also used as the power for the load connected for transistor output.
	CM	Digital input common	Common terminal to digital input signals.
Digital input (Safety function)	EN1,EN2	Safety function input terminal	When the circuit is open between EN1-PS or EN2-PS terminals, the switching element of the inverter main circuit is turned off and the output is shut off. (Certification being approved)
	PS		

Analog output and transistor output terminal

Items			Function
Analog output	AO1	Analog output 1	• Provides the monitor signal of 0 to ±10V DC for signals from the following: 0: Detected speed (Speedometer, one-way deflection) [N-FB1+] 1: Detected Speed (Speedometer, two-way deflection)[F-FB1±] 2: Speed setting 2 (Before acceleration/deceleration calculation) [N-REF2] 3: Speed setting 4 (ASR input) [N-REF4] 4: Detected speed [N-FB2±] 5: Detected line speed [LINE-N±] 6: Torque current reference (Torque ammeter, two-way deflection) [IT-REF±] 7: Torque current reference (Torque ammeter, one-way deflection) [IT-REF+] 8: Torque reference (Torque meter, two-way deflection) [T-REF±] 9: Torque reference (Torque meter, one-way deflection) [T-REF+] 10: Motor current rms value [V-AC] 11: Motor voltage rms value [V-AC] 12: Input power (motor output) [PWR] 13: DC link circuit voltage [V-DC] 14: +10V output test [P10] 15: -10V output test [N10] 30: Universal AO [U-AO] 31-37: Custom AO1 to 7 [C-AO1 to 7] 38: Input power [PWR-IN] 39: Magnetic pole position signal [SMP]
	AO2	Analog output 2	
	AO3	Analog output 3	
	M	Analog output common	Common terminal to analog output signals.
Transistor output	Y1	Transistor output 1	• Outputs the selected signals from the following items: 0: Inverter running [RUN] 1: Speed existence [N-EX] 2: Speed agreement [N-AG1] 3: Speed equivalence [N-AR] 4, 5, 6: Detected speed 1, 2, 3 [4: N-DT1, 5: N-DT2, 6: N-DT3] 7: Stopping on undervoltage [LU] 8: Detected torque polarity (braking/driving) [B/D] 9: Torque limiting [TL] 10, 11: Detected torque [10: T-DT1, 11: T-DT2] 12: KEYPAD operation mode [KP] 13: Inverter stopping [STOP] 14: Operation ready completion [RDY] 15: Magnetic-flux detection signal [MF-DT] 16: Motor M2 selection status [16: SW-M2] 17: Motor M3 selection status [16: SW-M3] 18: Brake release signal [BRK] 19: Alarm indication1 [AL1] 20: Alarm indication 2 [AL2] 21: Alarm indication 3 [AL4] 22: Alarm indication 4 [AL8] 23: Fan operation signal [FAN] 24: Auto-resetting [TRY] 25: Universal DO [U-DO] 26: Heat sink overheat early warning [INV-OH] 27: Synchronization completion signal [SY-C] 28: Lifetime alarm [LIFE] 29: Under accelerating [U-ACC] 30: Under decelerating [U-DEC] 31: Inverter overload early warning [INV-OL] 32: Motor temperature early warning [M-OH] 33: Motor overload early warning [M-OL] 34: DB overload early warning [DB-OL] 35: Link transmission error [LK-ERR] 36: Load adaptive control under limiting [ANL] 37: Load adaptive control under calculation [ANC] 38: Analog torque bias hold [TBH] 39-48: Custom DO 1 to 10 [C-DO 1 to 10] 50: Z-phase detection signal [Z-RDY] 51: Multiple-winding selected status [MTS] 52: Multiple-winding cancel response [MEC-AB] 53: Master selected status [MSS] 54: Parallel system self station alarm [AL-SF] 55: Communications error stopping [LES] 56: Alarm relay [ALM] 57: Minor fault [L-ALM] 58: Maintenance early warning [MNT] 59: Braking transistor error [DBAL] 60: DC fan lock signal [DCFL] 61: Speed agreement 2 [N-AG2] 62: Speed agreement 3 [N-AG3] 63: Axial fan operation stop signal [MFAN] 66: Droop selection response [DSAB] 67: Torque command/torque current command cancel response [TCL-C] 68: Torque limit mode cancel response [F40-AB] 71: 73 loading command [PRT-73] 72: Y-terminal test output ON [Y-ON] 73: Y-terminal test output OFF[Y-OFF]
	Y2	Transistor output 2	
	Y3	Transistor output 3	
	Y4	Transistor output 4	
	CMY	Transistor output common	Common terminal to transistor output signals.
Relay output	Y5A,Y5C	Relay output	Functions can be selected for signals like Y1 to Y4.
	30A,30B,30C	Alarm relay output (for any fault)	Outputs a non-voltage contact signal (1C) when a protective function is activated to stop inverter. Can select alarm for exciting or non exciting conditions.
Communications	DX+,DX-	RS-485 communications input/output	Input/output terminals for RS-485 communications. Can connect up to 31 inverters through a multidrop (daisy chain) connection. Half-duplex method.
	USB port	USB port	Front access, connector type: mini-B, USB 2.0 Full Speed
Speed detection	PA,PB	Pulse generator 2-phase signal input	Terminals for connecting 2-phase signal of pulse generator.
	PGP,PGM	Pulse generator power supply	+15V DC pulse generator power supply (or can be switched to +12V).
	FA,FB	Pulse generator output	Outputs the signal with which the pulse encoder signal is divided by free ratio (can be set by the function code). Open collector and complimentary (same voltage as PGP terminal) can be switched.
	CM	Pulse generator output common	Common terminals to FA and FB.
Temperature detection	TH1,THC	NTC Thermistor PTC Thermistor	Motor temperature can be detected with the NTC and the PTC thermistors. The motor overheat protective level can be specified by the PTC thermistor function.

Wiring Diagram

Basic Wiring Diagram



(Note1) Install a recommended molded-case circuit-breaker (MCCB) or an earth-leakage circuit-breaker (ELCB) (with an overcurrent protection function) in the primary circuit of the inverter to protect wiring. At this time, ensure that the circuit breaker capacity is equivalent to or lower than the recommended capacity.
(Note2) Install a magnetic contactor (MC) for each inverter to separate the inverter from the power supply, apart from the MCCB or ELCB, when necessary. Connect a surge absorber in parallel when installing a coil such as the MC or solenoid near the inverter.
(Note3) Connect this terminal to the power supply to retain relay alarm signals when the protection function is activated, or to keep the KEYPAD on even when the inverter main power supply is cut. The inverter can be operated without inputting the power to this terminal.
(Note4) Normally this is not necessary to connect. Used when combining the unit such as high power factor PWM converter with power regenerative function.
(Note5) When connecting a DC reactor (DCR option), remove the jumper bar from across the inverter main circuit terminals [P1] and [P(+)]. The DCR is a standard accessory for 75kW or larger capacity inverters. It must be connected when provided. The DCR is a standard accessory for the LD of 55kW and 75kW or larger capacity. It must be connected when provided. Use the DC reactor (option) under the following conditions: the capacity of the power transformer is 500kVA or more and is ten times or more than the inverter rated capacity, and a load from a thyristor exists on the same power supply system.
(Note6) A braking transistor is built in the inverters with 55kW or less (200V series) and160kW or less (400V series). It can be directly connected across P(+)-DB.
(Note7) When connecting a braking resistor to the inverter with the capacity 75kW or more (200V series) and 200kW or more (400V series), be sure to use a braking unit (option). Connect the braking unit (option) across P (+) and N (-). The auxiliary terminals [1] and [2] have polarity. Connect them according to the diagram above.
(Note8) This is a terminal for grounding the motor. To suppress inverter noise, it is recommended to use this terminal for motor grounding.
(Note9) Use the twisted or shielded cables for the ⬚ part. The shield cable should be grounded basically, however, if noise is significantly induced from external devices, it may be suppressed by connecting to 0V ([M], [11], [THC]) and 0V ([CM]). Set apart from the main circuit wiring as far as possible, and avoid installing in the same duct. (It is recommended to separate more than 10 cm.) If crossed, arrange so that it becomes almost perpendicular to the main circuit wiring.
(Note10) The functions indicated on terminal [X1] to [X9] (digital input), terminal [Y1] to [Y4] (transistor output), and terminal [Y5A/C] (contact output) are those allocated in the factory.
(Note11) This is a switching connector of the main circuit (fan power).
(Note12) This is a switch on the control PCB.
(Note13) The cooling fan power supply of the motor with 7.5kW or less is single-phase. Connect the terminal FU and FV. The cooling fan of the 400V series motor with 7.5kW or less is 200V/50Hz and 200 to 230V/60Hz.The cooling fan of the 400V series motor with 11kW or more is 400 to 420V/50Hz and 400 to 440V/60Hz. When using the cooling fan with a voltage other than these, use a transformer.
(Note14) The 0V ([M], [11], [THC]) and 0V ([CM]) are insulated inside the inverter.
(Note15) Trip the MCCB or magnetic contactor at the auxiliary contact point (manual restoration) of the thermal relay.
(Note16) A short-circuit conductor is connected between the safety function terminals [EN1] [EN2] and [PS] as the factory default. To use this function, remove the short-circuit conductor before connection.

Terminal Arrangement Diagram

Terminal Arrangement

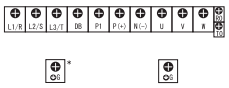
Control circuit terminals

Main circuit terminals

A02	A03	13	Ai2	TH1	PLC	X6	X7	X8	X9	Y2	Y3	Y4	FB	Y5C	Y5A	30B
A01	M	12	Ai1	THC	X1	X2	X3	X4	X5	CMY		Y1	FA	30C	30A	
DX+	DX-	11	M	CM	EN1	PS	EN2	CM	FWD	REV	CM	PGM	PGP	PA	PB	

FRN0.75VG1S-2J～FRN7.5VG1S-2J
FRN0.75VG1S-4J～FRN7.5VG1S-4J

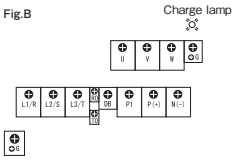
Fig.A



Screw size:
Main circuit:M5 Grounding:M5 Aux power(R0,T0):M3.5

FRN11VG1S-2J～FRN22VG1S-2J
FRN11VG1S-4J～FRN22VG1S-4J

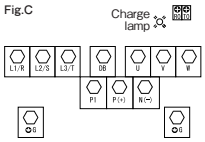
Fig.B



Screw size:
Main circuit:M6 Grounding:M6 Aux power(R0,T0):M3.5

FRN30VG1S-2J
FRN30VG1S-4J～FRN55VG1S-4J

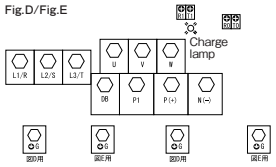
Fig.C



Screw size:
Main circuit:M8 Grounding:M8 Aux power(R0,T0):M3.5

FRN37VG1S-2J～FRN55VG1S-2J
FRN75VG1S-4J～FRN110VG1S-4J

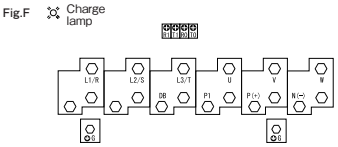
Fig.D/Fig.E



Screw size:
Main circuit:M10 Grounding:M8 Aux power(R0,T0):M3.5

FRN132VG1S-4J,FRN160VG1S-4J

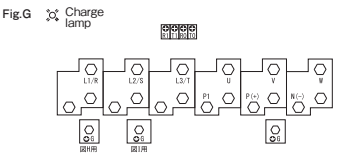
Fig.F



Screw size:
Main circuit:M12 Grounding:M10 Aux power(R0,T0):M3.5

FRN90VG1S-2J
FRN200VG1S-4J～FRN220VG1S-4J

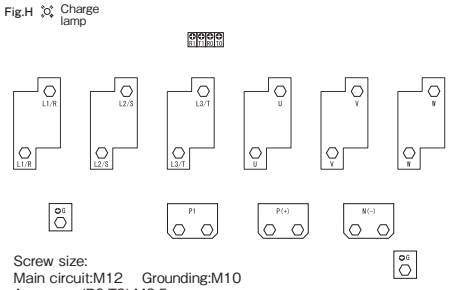
Fig.G



Screw size:
Main circuit:M12 Grounding:M10
Aux power(R0,T0):M3.5

FRN90VG1S-2J
FRN200VG1S-4J～FRN220VG1S-4J

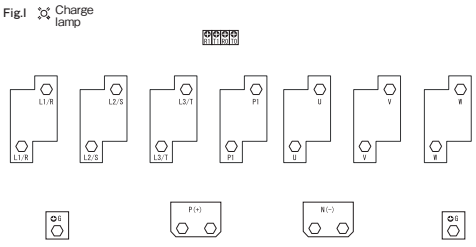
Fig.H



Screw size:
Main circuit:M12 Grounding:M10
Aux power(R0,T0):M3.5

FRN280VG1S-4J～FRN315VG1S-4J

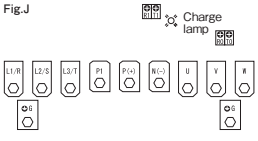
Fig.I



Screw size:
Main circuit:M12 Grounding:M10
Aux power(R0,T0):M3.5

FRN355VG1S-4J～FRN400VG1S-4J

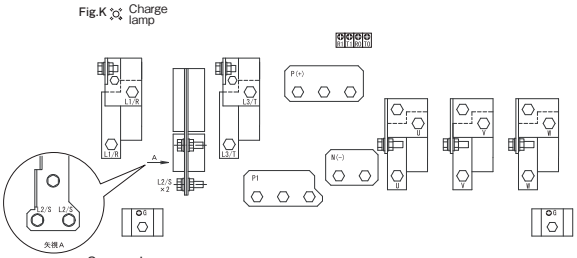
Fig.J



Screw size:
Main circuit:M12 Grounding:M10
Aux power(R0,T0):M3.5

FRN500VG1S-4J～FRN630VG1S-4J

Fig.K



Screw size:
Main circuit:M12 Grounding:M10
Aux power(R0,T0):M3.5

Names and Functions of the KEYPAD and Features

Names and Functions of the KEYPAD

Up/Down keys
Operation mode:
Increases or decreases the speed.
Program mode:
Changes the function codes and specified data values.

Program key
Switches the display to the menu screen or the initial screens for the operation and alarm modes.

Shift key (column shift)
Used to move the cursor horizontally for data change and to jump to another function block (when pressed with the UP/DOWN keys)

Reset key
Program mode:
Cancels the current input data and changes the screen.
Trip mode:
Releases from a trip stoppage.

Function/Data select key
Used to switch the displayed value of LED monitor, input the speed setting and store the function code data.

Unit indication
Displays the unit for the information that appears on the LED monitor.

Stop key
Stops motor operation.

LED monitor
Operation mode:
Displays the setting frequency, output current, output voltage, motor speed, and line speed.
Trip mode:
Displays the cause of a trip.

LCD monitor
Displays different information ranging from operation status to function data.
The real-time clock is installed as standard. NEW
Operation guidance is displayed scrolling at the bottom.

Operation key
Starts motor operation.

RUN LED
Lit during operation by the FWD/REV signal or by operation commands via communications.

HELP key NEW
Displays guidance screens including the key operation guidance from each LCD monitor display.

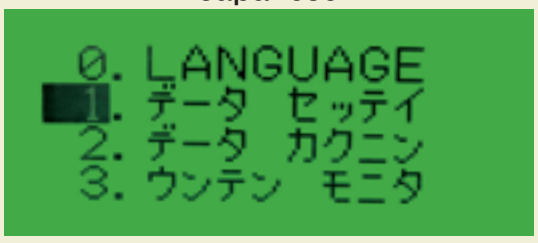
Features

- LCD with backlight that has a high level of visibility
- Large size 7-segment LED with 5-digit display
- Data of up to three inverters can be copied.
- Supported languages: Japanese, English, Chinese, Korean (hangul character), German* French*, Spain*, Italian*

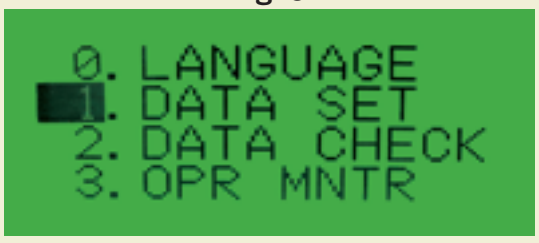
* Available soon

<Display sample>

Japanese



English



Chinese

Korean (hangul character)

Function setting

F: Fundamental Functions

indicates the factory setting.

Function code	485 No.	Link No.	Name	Setting range
F00	0h	80(50h)	Data protection	0 –1
F01	1h		Speed setting N1	0 –9
F02	2h		Operation method	0 –1
F03	3h	81(51h)	M1 max. speed	50– 1500 –30000r/min
F04	4h	82(52h)	M1 rated speed	50–30000r/min
F05	5h	83(53h)	M1 rated voltage	80–999V
F07	7h	84(54h)	Acceleration time 1	0.01– 5.00 –99.99s 100.0–999.9s 1000–3600s
F08	8h	85(55h)	Deceleration time 1	0.01– 5.00 –99.99s 100.0–999.9s 1000–3600s
F10	Ah	86(56h)	M1 electronic thermal overload relay (Select)	0 –2
F11	Bh	87(57h)	M1 electronic thermal overload relay (Level)	0.01–99.99A 100.0–999.9A 1000–2000A
F12	Ch	88(58h)	M1 electronic thermal overload relay (Thermal time constant)	0.5–75.0min
F14	Eh		Restart mode after momentary power failure (Select)	0 –5
F17	11h		Gain (for speed setting signal 12)	0.0– 100.0 –200.0%
F18	12h		Bias (for speed setting signal 12)	-30000– 0 –30000r/min
F20	14h	89(59h)	DC brake (Starting speed)	0 –3600r/min
F21	15h	90(5Ah)	DC brake (Braking level)	0 –100%
F22	16h	91(5Bh)	DC brake (Braking time)	0.0 –30.0s
F23	17h	92(5Ch)	Starting speed	0.0 –150.0r/min
F24	18h	93(5Dh)	Starting speed (Holding time)	0.00 –10.00s
F26	1Ah	94(5Eh)	Motor sound (Carrier freq.)	2– 7 –15kHz
F36	24h		30RY operation mode	0 –1
F37	25h	96(60h)	Stop speed	0.0– 10.0 –150.0r/min
F38	26h	97(61h)	Stop speed (Detection method)	0 –1
F39	27h	98(62h)	Stop speed (Zero speed holding time)	0.00– 0.50 –10.00s
F40	28h	99(63h)	Torque limiter mode 1	0 –3
F41	29h	100(64h)	Torque limiter mode 2	0 –3
F42	2Ah	101(65h)	Torque limiter value (level 1) selection	0 –5
F43	2Bh	102(66h)	Torque limiter value (level 2) selection	0 –5
F44	2Ch	103(67h)	Torque limiter value (level 1)	-300– 150 –300%
F45	2Dh	104(68h)	Torque limiter value (level 2)	-300– 10 –300%
F46	2Eh	105(69h)	Mechanical loss compensation value	-300.00– 0.00 –300.00%
F47	2Fh	106(6Ah)	Torque bias T1	-300.00– 0.00 –300.00%
F48	30h		Torque bias T2	-300.00– 0.00 –300.00%
F49	31h		Torque bias T3	-300.00– 0.00 –300.00%
F50	32h		Torque bias activation timer	0.00 –1.00s
F51	33h	251(FBh)	Torque reference monitor (Polarity selection)	0 –1
F52	34h		LED monitor (Display coefficient A)	-999.00– 1.00 –999.00
F53	35h		LED monitor (Display coefficient B)	-999.00– 1.00 –999.00
F54	36h		LED monitor (Display filter)	0.0– 0.2 –5.0s
F55	37h		LED monitor (Display selection)	0 –32
F56	38h		LED monitor (Display at stopping state)	0 –1
F57	39h		LCD monitor (Display selection)	0 –1
F58	3Ah		LCD monitor (Language selection)	0 –7
F59	3Bh		LCD monitor (Contrast adjusting)	0– 5 –10
F60	3Ch		Output unit (HP/kW) selection	0 –1
F61	3Dh	107(6Bh)	ASR1-P (Gain)	0.1– 10.0 –500.0
F62	3Eh	108(6Ch)	ASR1-I (Constant of integration)	0.000– 0.200 –10.000s
F63	3Fh	109(6Dh)	ASR1-FF (Gain)	0.000 –9.999s
F64	40h	110(6Eh)	ASR1 input filter	0.000– 0.040 –5.000s
F65	41h	111(6Fh)	ASR1 detection filter	0.000– 0.005 –0.100s
F66	42h	112(70h)	ASR1 output filter	0.000– 0.002 –0.100s
F67	43h	113(71h)	S-curve acceleration start side 1	0 –50%
F68	44h	114(72h)	S-curve acceleration end side 1	0 –50%
F69	45h	115(73h)	S-curve deceleration start side 1	0 –50%
F70	46h	116(74h)	S-curve deceleration end side 1	0 –50%
F72	48h		Spare excitation mode selection	0 –1
F73	49h		Magnetic-flux level at light load	10– 100 %
F74	4Ah	117(75h)	Pre-excitation time	0.0 –10.0s
F75	4Bh	118(76h)	Pre-excitation initial level	100 –400%
F76	4Ch		Speed limiter (method selection)	0 –3
F77	4Dh	79(4Fh)	Speed limiter level 1	-110.0– 100.0 –110.0%
F78	4Eh	254(FEh)	Speed limiter level 2	-110.0– 100.0 –110.0%
F79	4Fh	119(77h)	Motor selection (M1, M2, M3)	0 –2
F80	50h		Current rating switching	0 –3
F81	51h		Offset (for speed setting signal 12)	-30000– 0 –30000r/min
F82	52h		Dead-band (for speed setting signal 12)	0.0 –150.0r/min
F83	53h		Filter (for speed setting signal 12)	0.000– 0.005 –5.000s
F84	54h		Cumulative power data display coefficient	0.000– 0.010 –9999
F85	55h		Torque calculation value filter	0.000– 0.100 –1.000

E: Extension Terminal Functions

Function code	485 No.	Link No.	Name	Setting range
E01	101h	120(78h)	X1 function selection	0 –76
E02	102h	121(79h)	X2 function selection	0– 1 –76
E03	103h	122(7Ah)	X3 function selection	0– 2 –76
E04	104h	123(7Bh)	X4 function selection	0– 3 –76
E05	105h	124(7Ch)	X5 function selection	0– 4 –76
E06	106h	125(7Dh)	X6 function selection	0– 5 –76
E07	107h	126(7Eh)	X7 function selection	0– 7 –76
E08	108h	127(7Fh)	X8 function selection	0– 8 –76
E09	109h	128(80h)	X9 function selection	0– 9 –76
E10	10Ah	129(81h)	X11 function selection	0– 25 –76
E11	10Bh	130(82h)	X12 function selection	0– 25 –76
E12	10Ch	131(83h)	X13 function selection	0– 25 –76
E13	10Dh	132(84h)	X14 function selection	0– 25 –76
E14	10Eh		X function normally open/normally closed	0000 –01FF
E15	10Fh	133(85h)	Y1 function selection	0– 1 –73
E16	110h	134(86h)	Y2 function selection	0– 2 –73
E17	111h	135(87h)	Y3 function selection	0– 3 –73
E18	112h	136(88h)	Y4 function selection	0– 4 –73
E19	113h	137(89h)	Y5 function selection	0– 14 –73
E20	114h	138(8Ah)	Y11 function selection	0– 26 –73
E21	115h	139(8Bh)	Y12 function selection	0– 26 –73
E22	116h	140(8Ch)	Y13 function selection	0– 26 –73
E23	117h	141(8Dh)	Y14 function selection	0– 26 –73
E24	118h	142(8Eh)	Y15 function selection	0– 26 –73
E25	119h	143(8Fh)	Y16 function selection	0– 26 –73
E26	11Ah	144(90h)	Y17 function selection	0– 26 –73
E27	11Bh	145(91h)	Y18 function selection	0– 26 –73
E28	11Ch		Y function normally open/normally closed	0000 –001F
E29	11Dh	146(92h)	PG pulse output selection	0 –10
E30	11Eh		Motor overheat protection (Temperature)	50– 150 –200℃
E31	11Fh		Motor overheat early warning (Temperature)	50– 75 –200℃
E32	120h	205(CDh)	M1–M3 PTC operation level	0.00– 1.60 –5.00V
E33	121h		Inverter overload early warning	25– 90 –100%
E34	122h		Motor overload early warning	25– 90 –100%
E35	123h		DB overload protection	0 –100%
E36	124h		DB overload early warning	0– 80 –100%
E37	125h		DB thermal time constant	0– 300 –1000s
E38	126h	147(93h)	Speed detection method	000 –111
E39	127h	148(94h)	Speed detection level 1	0– 1500 –30000r/m

You can change the setting of the functions indicated with ▭ during operation. Stop the operation before changing other functions.

Function setting

indicates the factory setting.

Function code	485 No.	Link No.	Name	Setting range
E40	128h	149(95h)	Speed detection level 2	-30000– 1500 –30000r/m
E41	129h	150(96h)	Speed detection level 3	-30000– 1500 –30000r/m
E42	12Ah	151(97h)	Speed equivalence (Detection range)	1.0– 3.0 –20.0%
E43	12Bh	152(98h)	Speed agreement (Detection range)	1.0– 3.0 –20.0%
E44	12Ch	153(99h)	Speed agreement (Off delay timer)	0.000– 0.100 –5.000s
E45	12Dh	154(9Ah)	Enable/disable alarm for speed disagreement	00 –21
E46	12Eh	155(9Bh)	Torque detection level 1	0– 30 –300%
E47	12Fh	156(9Ch)	Torque detection level 2	0– 30 –300%
E48	130h	157(9Dh)	Magnetic-flux detection level	10– 100 %
E49	131h		Ai1 function selection	0 –26
E50	132h		Ai2 function selection	0 –26
E51	133h		Ai3 function selection	0 –26
E52	134h		Ai4 function selection	0 –26
E53	135h		Ai1 gain setting	-10.000– 1.000 –10.000(times)
E54	136h		Ai2 gain setting	-10.000– 1.000 –10.000(times)
E55	137h		Ai3 gain setting	-10.000– 1.000 –10.000(times)
E56	138h		Ai4 gain setting	-10.000– 1.000 –10.000(times)
E57	139h		Ai1 bias setting	-100.0– 0.0 –100.0%
E58	13Ah		Ai2 bias setting	-100.0– 0.0 –100.0%
E59	13Bh		Ai3 bias setting	-100.0– 0.0 –100.0%
E60	13Ch		Ai4 bias setting	-100.0– 0.0 –100.0%
E61	13Dh		Ai1 filter setting	0.000– 0.010 –0.500s
E62	13Eh		Ai2 filter setting	0.000– 0.010 –0.500s
E63	13Fh		Ai3 filter setting	0.000– 0.010 –0.500s
E64	140h		Ai4 filter setting	0.000– 0.010 –0.500s
E65	141h		Increment/decrement limiter (Ai1)	0.00 –60.00s
E66	142h		Increment/decrement limiter (Ai2)	0.00 –60.00s
E67	143h		Increment/decrement limiter (Ai3)	0.00 –60.00s
E68	144h		Increment/decrement limiter (Ai4)	0.00 –60.00s
E69	145h		AO1 function selection	0– 1 –39
E70	146h		AO2 function selection	0– 6 –39
E71	147h		AO3 function selection	0– 3 –39
E72	148h		AO4 function selection	0 –39
E73	149h		AO5 function selection	0 –39
E74	14Ah		AO1 gain setting	-100.00– 1.00 –100.00(times)
E75	14Bh		AO2 gain setting	-100.00– 1.00 –100.00(times)
E76	14Ch		AO3 gain setting	-100.00– 1.00 –100.00(times)
E77	14Dh		AO4 gain setting	-100.00– 1.00 –100.00(times)
E78	14Eh		AO5 gain setting	-100.00– 1.00 –100.00(times)
E79	14Fh		AO1 bias setting	-100.0– 0.0 –100.0%
E80	150h		AO2 bias setting	-100.0– 0.0 –100.0%
E81	151h		AO3 bias setting	-100.0– 0.0 –100.0%
E82	152h		AO4 bias setting	-100.0– 0.0 –100.0%
E83	153h		AO5 bias setting	-100.0– 0.0 –100.0%
E84	154h		AO1-5 filter setting	0.000– 0.010 –0.500s
E90	15Ah		Link command function selection 1	0 –12
E91	15Bh		Link command function selection 2	0 –12
E101	1E01h		Ai1 offset	-100.00– 0.00 –100.00%
E102	1E02h		Ai2 offset	-100.00– 0.00 –100.00%
E103	1E03h		Ai3 offset	-100.00– 0.00 –100.00%
E104	1E04h		Ai4 offset	-100.00– 0.00 –100.00%
E105	1E05h		Ai1 dead-band	0.00 –10.00%
E106	1E06h		Ai2 dead-band	0.00 –10.00%
E107	1E07h		Ai3 dead-band	0.00 –10.00%
E108	1E08h		Ai4 dead-band	0.00 –10.00%
E109	1E09h		Pulse dividing (numerator)	1– 1000 –65535
E110	1E0Ah		Pulse dividing (denominator)	1– 1000 –65535
E114	1E0Eh		Speed agreement no.2 (detection range)	1.0– 3.0 –20.0%
E115	1E0Fh		Speed agreement no.2 (off delay timer)	0.000– 0.100 –5.000s
E116	1E10h		Speed agreement no.3 (detection range)	1.0– 3.0 –20.0%
E117	1E11h		Speed agreement no.3 (off delay timer)	0.000– 0.100 –5.000s
E118	1E12h		Axial fan stop signal setting temperature	0 –200℃

You can change the setting of the functions indicated with during operation. Stop the operation before changing other functions.

C:Control Functions of Frequency

Function code	485 No.	Link No.	Name	Setting range
C01	201h		Jump speed 1	0 –30000r/m
C02	202h		Jump speed 2	0 –30000r/m
C03	203h		Jump speed 3	0 –30000r/m
C04	204h		Jump hysteresis	0 –1000r/m
C05	205h	158(9Eh)	Multistep speed 1	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C06	206h	159(9Fh)	Multistep speed 2	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C07	207h	160(A0h)	Multistep speed 3	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C08	208h	161(A1h)	Multistep speed 4	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C09	209h	162(A2h)	Multistep speed 5	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C10	20Ah	163(A3h)	Multistep speed 6	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C11	20Bh	164(A4h)	Multistep speed 7	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C12	20Ch		Multistep speed 8	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C13	20Dh		Multistep speed 9	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C14	20Eh		Multistep speed 10	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C15	20Fh		Multistep speed 11	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C16	210h		Multistep speed 12	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C17	211h		Multistep speed 13	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C18	212h		Multistep speed 14/Creep speed 1	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C19	213h		Multistep speed 15/Creep speed 2	0 –30000r/m / 0.00 –100.00% / 0.0 –999.9m/m
C20	214h		Multistep speed reference agreement timer	0.000 –0.100s
C21	215h		Multistep setting definition	0 –2
C25	219h		Speed setting N2	0 –9
C29	21Dh		Jogging speed	0– 50 –30000r/m
C30	21Eh		ASR-P (Gain) JOG	0.1– 10.0 –500.0(times)
C31	21Fh		ASR-I (Constant of integration) JOG	0.000– 0.200 –10.000s
C32	220h		ASR-JOG input filter	0.000– 0.040 –5.000s
C33	221h		ASR-JOG detection filter	0.000– 0.005 –0.100s
C34	222h		ASR-JOG output filter	0.000– 0.002 –0.100s
C35	223h		Acceleration time JOG	0.01– 5.00 –99.99s 100.0–999.9s 1000–3600s
C36	224h		Deceleration time JOG	0.01– 5.00 –99.99s 100.0–999.9s 1000–3600s
C37	225h		S-curve start side JOG	0 –50%
C38	226h		S-curve end side JOG	0 –50%
C40	228h		ASR2-P Gain	0.1– 10.0 –500.0(times)
C41	229h		ASR2-I (Constant of integration)	0.000– 0.200 –10.000s
C42	22Ah		ASR2-FF (Gain)	0.000 –9.999s
C43	22Bh		ASR2 input filter	0.000– 0.040 –5.000s

indicates the factory setting.

Function code	485 No.	Link No.	Name	Setting range
C44	22Ch		ASR2 detection filter	0.000–[0.005]–0.100s
C45	22Dh		ASR2 output filter	0.000–[0.002]–0.100s
C46	22Eh		Acceleration time 2	0.01–[5.00]–99.99s 100.0–999.9s 1000–3600s
C47	22Fh		Deceleration time 2	0.01–[5.00]–99.99s 100.0–999.9s 1000–3600s
C48	230h		S-curve start side 2	[0]–50%
C49	231h		S-curve end side 2	[0]–50%
C50	232h		ASR3-P gain	0.1–[10.0]–500.0(times)
C51	233h		ASR3-I (Constant of integration)	0.000–[0.200]–10.000s
C52	234h		ASR3-FF (Gain)	[0.000]–9.999s
C53	235h		ASR3 input filter	0.000–[0.040]–5.000s
C54	236h		ASR3 detection filter	0.000–[0.005]–0.100s
C55	237h		ASR3 output filter	0.000–[0.002]–0.100s
C56	238h		Acceleration time 3	0.01–[5.00]–99.99s 100.0–999.9s 1000–3600s
C57	239h		Deceleration time 3	0.01–[5.00]–99.99s 100.0–999.9s 1000–3600s
C58	23Ah		S-curve start side 3	[0]–50%
C59	23Bh		S-curve end side 3	[0]–50%
C60	23Ch		ASR4-P gain	0.1–[10.0]–500.0(times)
C61	23Dh		ASR4-I (Constant of integration)	0.000–[0.200]–10.000s
C62	23Eh		ASR4-FF (Gain)	[0.000]–9.999s
C63	23Fh		ASR4 input filter	0.000–[0.040]–5.000s
C64	240h		ASR4 detection filter	0.000–[0.005]–0.100s
C65	241h		ASR4 output filter	0.000–[0.002]–0.100s
C66	242h		Acceleration time 4	0.01–[5.00]–99.99s 100.0–999.9s 1000–3600s
C67	243h		Deceleration time 4	0.01–[5.00]–99.99s 100.0–999.9s 1000–3600s
C68	244h		S-curve start side 4	[0]–50%
C69	245h		S-curve end side 4	[0]–50%
C70	246h		ASR switching time	0.00–[1.00]–2.55s
C71	247h	165(A5h)	Acceleration/deceleration time switching speed	[0.00]–100.00%
C72	248h	166(A6h)	ASR switching time	[0.00]–100.00%
C73	249h		Creep speed switching (on UP/DOWN control)	[00]–11

P:Motor Parameters

Function code	485 No.	Link No.	Name	Setting range
P01	301h		M1 control method	[0]–5
P02	302h		M1 motor selection	0–50
P03	303h	167(A7h)	M1 rated capacity	0.00–1200kW(F60=0) 0.00–1600HP(F60=1)
P04	304h	168(A8h)	M1 rated current	0.01–99.99A 100.0–999.9A 1000–2000A
P05	305h	169(A9h)	M1 pole number	2–[4]–100(poles)
P06	306h	170(AAh)	M1-%R1	0.00–30.00%
P07	307h	171(ABh)	M1-%X	0.00–200.00%
P08	308h	172(ACh)	M1 exciting current/ Magnetic-flux damped current (-Id)	0.01–99.99A 100.0–999.9A 1000–2000A
P09	309h	173(ADh)	M1 torque current	0.01–99.99A 100.0–999.9A 1000–2000A
P10	30Ah	174(AEh)	M1 slip on driving	0.001–10.000Hz
P11	30Bh	175(AFh)	M1 slip on braking	0.001–10.000Hz
P12	30Ch	176(B0h)	M1 iron loss coefficient 1	0.00–10.00%
P13	30Dh	177(B1h)	M1 iron loss coefficient 2	0.00–10.00%
P14	30Eh	178(B2h)	M1 iron loss coefficient 3	0.00–10.00%
P15	30Fh	179(B3h)	M1 magnetic saturation coefficient 1	0.0–100.0%
P16	310h	180(B4h)	M1 magnetic saturation coefficient 2	0.0–100.0%
P17	311h	181(B5h)	M1 magnetic saturation coefficient 3	0.0–100.0%
P18	312h	182(B6h)	M1 magnetic saturation coefficient 4	0.0–100.0%
P19	313h	183(B7h)	M1 magnetic saturation coefficient 5	0.0–100.0%
P20	314h	184(B8h)	M1 secondary time constant	0.001–9.999s
P21	315h	185(B9h)	M1 induced voltage coefficient	0–999V
P22	316h	186(BAh)	M1 R2 correction coefficient 1	0.500–5.000
P23	317h	187(BBh)	M1 R2 correction coefficient 2	0.500–5.000
P24	318h	188(BCh)	M1 R2 correction coefficient 3	0.010–5.000
P25	319h	189(BDh)	M1 exciting current correction coefficient	0.000–5.000
P26	31Ah	190(BEh)	M1-ACR-P (Gain)	0.1–[1.0]–20.0
P27	31Bh	191(BFh)	M1-ACR-I (Integration time)	0.1–[1.0]–100.0ms
P28	31Ch	192(C0h)	M1-PG pulse number	100–[1024]–60000
P29	31Dh	214(D6h)	M1 external PG correction coefficient	0000–[4000]–4FFF
P30	31Eh	193(C1h)	M1 thermistor selection	0–[1]–3
P32	320h		M1 online auto tuning	[0]–1
P33	321h		M1 maximum output voltage/ Maximum voltage limit value	200V:80–[220]–999V 400V:80–[440]–999V
P34	322h		M1 slip compensation amount	-20.000–[0.000]–5.000Hz
P35	323h		M1 torque boost	[0.0]–20.0
P36	324h		M1 current vibration suppressing gain	0.00–[0.20]–1.00

You can change the setting of the functions indicated with during operation. Stop the operation before changing other functions.

H:High Performance Functions

Function code	485 No.	Link No.	Name	Setting range
H01	401h		Tuning operation selection	[0]–4
H02	402h	14(Eh)	All save function	[0]–1
H03	403h		Data initializing	[0]–1
H04	404h		Auto-reset (Times)	[0]–10
H05	405h		Auto-reset (Reset interval)	0.01–[5.00]–20.00s
H06	406h		Fan stop operation	[0]–1
H08	408h		Rev. phase sequence lock	[0]–1
H09	409h	194(C2h)	Start mode (Rotating motor pick up)	0–[2]
H10	40Ah	195(C3h)	Energy-saving operation	[0]–1
H11	40Bh		Automatic operation OFF function	[0]–4
H13	40Dh	196(C4h)	Auto-restart (Restart time)	0.1–[0.5]–5.0s
H14	40Eh		Auto-restart (Speed fall rate)	1–[500]–3600r/m/s
H15	40Fh		Auto- restart (Holding DC voltage)	3-phase 200V:200–[235]–300V 3-phase 400V:400–[470]–600V
H16	410h		Auto-restart (Operation command selfhold setting)	0–[1]
H17	411h		Auto-restart (Operation command selfhold time)	0.0–[30.0]s
H19	413h	197(C5h)	Active drive	[0]–1
H20	414h	198(C6h)	PID control	[0]–3
H21	415h	199(C7h)	Command selection	[0]–1
H22	416h	201(C9h)	P-gain	0.000–[1.000]–10.000(times)
H23	417h	202(CAh)	I-gain	0.00–[1.00]–100.00s
H24	418h	203(CBh)	D-gain	[0.000]–10.000s
H25	419h	200(C8h)	Output upper limit value	-300–[100]–300%

Function setting

indicates the factory setting.

Function code	485 No.	Link No.	Name	Setting range
H26	41Ah	204(CCh)	Output lower limit value	-300– -100 –300%
H27	41Bh	206(CEh)	Speed reference selection	0 –2
H28	41Ch	207(CFh)	Droop operation	0.0 –25.0%
H29	41Dh		Link function protection	0 –1
H30	41Eh	208(D0h)	Serial link	0 –3
H31	41Fh		RS-485 (Address)	0– 1 –255
H32	420h		RS-485 (Mode select on no response error)	0– 3
H33	421h		RS-485 (Timer)	0.01– 2.00 –20.00s
H34	422h		RS-485 (Baud rate)	0 –4
H35	423h		RS-485 (Data length)	0 –1
H36	424h		RS-485 (Parity check)	0– 1 –2
H37	425h		RS-485 (Stop bits)	0– 1
H38	426h		RS-485 (No response error detection time)	0.0– 60.0 s
H39	427h		RS-485 (Response interval)	0.00– 0.01 –1.00s
H40	428h		Protocol selection	0– 1 –2
H41	429h	209(D1h)	Torque reference selection	0 –5
H42	42Ah	210(D2h)	Torque current reference selection	0 –4
H43	42Bh	211(D3h)	Magnetic-flux reference selection	0 –3
H44	42Ch	212(D4h)	Magnetic-flux reference value	10– 100 %
H46	42Eh	215(D7h)	Observer type selection	0 –2
H47	42Fh	216(D8h)	M1 compensation gain	0.00 –1.00(times)
H48	430h		M2 compensation gain	0.00 –1.00(times)
H49	431h	217(D9h)	M1 integration time	0.005– 0.100 –1.000s
H50	432h		M2 integration time	0.005– 0.100 –1.000s
H51	433h	218(DAh)	M1 load inertia	0.001–50.000kgm^2
H52	434h		M2 load inertia	0.001 –50.000kgm^2
H53	435h	213(D5h)	Line speed feedback selection	0 –3
H55	437h		Zero speed control (Gain)	0– 5 –100(times)
H56	438h		Zero speed control (completion range)	0– 100 pulse
H57	439h		Overvoltage suppressing function	0 –1
H58	43Ah		Overcurrent suppressing function	0 –1
H60	43Ch		Load adaptive control function definition 1	0 –3
H61	43Dh		Load adaptive control function definition 2	0 –1
H62	43Eh		Winding up speed	0.0 –999.9m/m
H63	43Fh		Counter weight mass	0.00 –600.00t
H64	440h		Safety coefficient	0.50– 1.00 –1.20
H65	441h		Mechanical efficiency	0.500 –1.000
H66	442h		Rated loading	0.00 –600.00t
H68	444h		Trip data delete	0 –1
H70	446h		Reserved 1	0 –9999
H71	447h		Reserved 2	0 –10
H74	44Ah		PG detection circuit self-shutoff mode selection	0 –1
H75	44Bh		Main circuit output wiring phase sequence setting	0 –1
H76	44Ch		Main power supply cut detection	0 –1
H77	44Dh		Cooling fan ON-OFF control continuation timer	0– 600 s
H78	44Eh		Number of starts/Operation time initialization	0 –6
H79	44Fh		Cooling fan accumulated operation time Factory default setting	0 –65535(10h)
H80	450h		Main circuit capacitor capacity Factory default measurement	0 –32767
H81	451h		Setting main circuit accumulated time for capacitor life to Factory default	0 –65535(10h)
H82	452h		Maintenance setting number of starts	0 –65535
H83	453h		Maintenance setting time	0– 8760 –65535(10h)
H85	455h		Setting time: year/month	0000– 0001 –FFFF
H86	456h		Setting time: day/time	0000– 0100 –FFFF
H87	457h		Setting time: min/sec	0000 –FFFF
H88	458h		Clock time setting	0 –1
H90	45Ah		Overspeed alarm detection level	100– 120 –160%
H103	1F03h		Protection/maintenance mode selection 1	0000– 0101 –1111
H104	1F04h		Protection/maintenance mode selection 2	0000– 1110 –1111
H105	1F05h		Protection/maintenance mode selection 3	0000 –1111
H106	1F06h		Minor fault definition 1	0000 –1111
H107	1F07h		Minor fault definition 2	0000 –1111
H108	1F08h		Minor fault definition 3	0000 –1111
H109	1F09h		Minor fault definition 4	0000 –1111
H110	1F0Ah		Minor fault definition 5	0000 –1111
H111	1F0Bh		Minor fault definition 6	0 –1
H112	1F0Ch		M1 magnetic saturation expansion coefficient 6	0.0– 43.8 –100.0 %
H113	1F0Dh		M1 magnetic saturation expansion coefficient 7	0.0– 37.5 –100.0 %
H114	1F0Eh		M1 magnetic saturation expansion coefficient 8	0.0– 31.3 –100.0 %
H115	1F0Fh		M1 magnetic saturation expansion coefficient 9	0.0– 25.0 –100.0 %
H116	1F10h		M1 magnetic saturation expansion coefficient 10	0.0– 18.8 –100.0 %
H117	1F11h		M1 magnetic saturation expansion coefficient 11	0.0– 12.5 –100.0 %
H118	1F12h		M1 magnetic saturation expansion coefficient 12	0.0– 6.3 –100.0 %
H125	1F19h		M3 compensation gain	0.00 –1.00(times)
H126	1F1Ah		M3 integration time	0.005– 0.100 –1.000s
H127	1F1Bh		M3 load inertia	0.001 –50,000kgm^2
H142	1F2Ah		Simulated fault	0 –1
H149	1F31h		Mechanical runaway detection speed setting	0.0 –20.0%
H201	2001h		Load adaptive control parameter switching*1	0 –1
H202	2002h		Load inertia (winding up 1)*1	0.001 –50.000 kgm^2
H203	2003h		Safety coefficient (winding up 1)*1	0.50– 1.00 –1.20
H204	2004h		Mechanical efficiency (winding up 1)*1	0.500 –1.000
H205	2005h		Load inertia (winding up 2)*1	0.001 –50.000 kgm^2
H206	2006h		Safety coefficient (winding up 2)*1	0.50– 1.00 –1.20
H207	2007h		Mechanical efficiency (winding up 2)*1	0.500 –1.000
H208	2008h		Load inertia (winding down 1)*1	0.001 –50.000 kgm^2
H209	2009h		Safety coefficient (winding down 1)*1	0.50– 1.00 –1.20
H210	200Ah		Mechanical efficiency (winding down 1)*1	0.500 –1.000
H211	200Bh		Load inertia (winding down 2)*1	0.001 –50.000 kgm^2
H212	200Ch		Safety coefficient (winding down 2)*1	0.50– 1.00 –1.20
H213	200Dh		Mechanical efficiency (winding down 2)*1	0.500 –1.000
H214	200Eh		Multilimit speed pattern function selection*1	0 –1
H215	200Fh		Multilimit speed pattern *1 (maximum speed)	0.1– 50.0 –100.0 %
H216	2010h		Multilimit speed pattern*1 (rated speed)	0.1– 100.0 %
H217	2011h		Multilimit speed pattern*1 (rated speed ×1.1)	0.1– 90.9 –100.0 %
H218	2012h		Multilimit speed pattern*1 (rated speed ×1.2)	0.1– 83.3 –100.0 %
H219	2013h		Multilimit speed pattern*1 (rated speed ×1.4)	0.1– 71.4 –100.0 %
H220	2014h		Multilimit speed pattern*1 (rated speed ×1.6)	0.1– 62.5 –100.0 %
H221	2015h		Multilimit speed pattern*1 (rated speed ×1.8)	0.1– 55.5 –100.0 %
H222	2016h		Multilimit speed pattern*1 (rated speed ×2.0)	0.1– 50.0 –100.0 %
H223	2017h		Multilimit speed pattern*1 (rated speed ×2.5)	0.1– 40.0 –100.0 %
H224	2018h		Multilimit speed pattern*1 (rated speed ×3.0)	0.1– 33.3 –100.0 %
H225	2019h		Limit speed judgment zone*1 (start speed)	0.1– 75.0 –100.0 %
H226	201Ah		Limit speed judgment zone*1 (end speed)	0.1– 93.7 –100.0 %
H227	201Bh		Load adaptive control function definition 3 *1	0 –2
H228	201Ch		Load inertia ratio setting*1	0 –2

You can change the setting of the functions indicated with during operation. Stop the operation before changing other functions.

*1: Soon to be supported

indicates the factory setting.

A:Alternative Motor Parameters

Function code	Communications address 485No.	Link No.	Name	Setting range
A01	501h		M2 control method	0 –5
A02	502h		M2 rated capacity	0.00 –1200kW(F60=0) 0.00 –1600HP(F60=1)
A03	503h		M2 rated current	0.01 –99.99A 100.0–999.9A 1000–2000A
A04	504h		M2 rated voltage	80 –999V
A05	505h		M2 rated speed	50– 1500 –30000r/min
A06	506h		M2 maximum speed	50– 1500 –30000r/min
A07	507h		M2 pole number	2– 4 –100(poles)
A08	508h		M2-%R1	0.00 –30.00%
A09	509h		M2-%X	0.00 –200.00%
A10	50Ah		M2 exciting current/ Magnetic-flux damped current (–Id)	0.01 –99.99A 100.0–999.9A 1000–2000A
A11	50Bh		M2 torque current	0.01 –99.99A 100.0–999.9A 1000–2000A
A12	50Ch		M2 slip on driving	0.001 –10.000Hz
A13	50Dh		M2 slip on braking	0.001 –10.000Hz
A14	50Eh		M2 iron loss coefficient 1	0.00 –10.00%
A15	50Fh		M2 iron loss coefficient 2	0.00 –10.00%
A16	510h		M2 iron loss coefficient 3	0.00 –10.00%
A17	511h		M2 magnetic saturation 1	0.0– 93.8 –100.0%
A18	512h		M2 magnetic saturation 2	0.0– 87.5 –100.0%
A19	513h		M2 magnetic saturation 3	0.0– 75.0 –100.0%
A20	514h		M2 magnetic saturation 4	0.0– 62.5 –100.0%
A21	515h		M2 magnetic saturation 5	0.0– 50.0 –100.0%
A22	516h		M2 secondary time constant	0.001 –9.999s
A23	517h		M2 induced voltage coefficient	0 –999V
A24	518h		M2 R2 correction coefficient 1	0.000– 1.000 –5.000
A25	519h		M2 R2 correction coefficient 2	0.000– 1.000 –5.000
A26	51Ah		M2 R2 correction coefficient 3	0.010– 1.000 –5.000
A27	51Bh		M2 exciting current correction coefficient	0.000 –5.000
A28	51Ch		M2-ACR-P (Gain)	0.1– 1.0 –20.0
A29	51Dh		M2-ACR-I (Integration time)	0.1– 1.0 –100.0ms
A30	51Eh		M2-PG pulse number	100– 1024 –60000
A31	51Fh		M2 thermistor selection	0– 1 –3
A32	520h		M2 electronic thermal overload relay (Select)	0 –2
A33	521h		M2 electronic thermal overload relay (Level)	0.01 –99.99A 100.0–999.9A 1000–2000A
A34	522h		M2 electronic thermal overload relay (Thermal time constant)	0.5 –75.0min
A51	533h		M2 External PG correction coefficient	0000– 4000 –4FFF
A52	534h		M2 online auto tuning	0 –1
A53	535h		M2 maximum output voltage/ Maximum voltage limit value	80 –999V
A54	536h		M2 slip compensation amount	-20.000– 0.000 –5.000Hz
A55	537h		M2 torque boost	0.0 –20.0
A56	538h		M2 current vibration suppressing gain	0.00– 0.20 –1.00
A59	53Bh		M2 ABS signal input definition	0 –16
A60	53Ch		M2 magnetic pole position offset	0.0 –359.9
A61	53Dh		M2 salient pole ratio (%Xq/%Xd)	1.000 –3.000
A64	540h		M2 overcurrent protection level	0.00 ,0.01–2000A
A101	2401h		M3 control method	0 –5
A102	2402h	229(E5h)	M3 motor rated capacity	0.00 –1200kW(F60=0) 0.00 –1600HP(F60=1)
A103	2403h	230(E6h)	M3 motor rated current	0.01 –99.99A 100.0–999.9A 1000–2000A
A104	2404h	231(E7h)	M3 rated voltage	80 –999V
A105	2405h	233(E9h)	M3 rated speed	50– 1500 –30000r/m
A106	2406h	234(EAh)	M3 maximum speed	50– 1500 –30000r/min
A107	2407h	235(EBh)	M3 motor pole number	2– 4 –100(poles)
A108	2408h	236(ECh)	M3 %R1	0.00 –30.00%
A109	2409h	237(EDh)	M3 %X	0.00 –200.00%
A110	240Ah	238(EEh)	M3 exciting current/ Magnetic-flux damped current (–Id)	0.01 –99.99A 100.0–999.9A 1000–2000A
A111	240Bh		M3 torque current	0.01 –99.99A 100.0–999.9A 1000–2000A
A112	240Ch		M3 slip on driving	0.001 –10.000Hz
A113	240Dh		M3 slip on braking	0.001 –10.000Hz
A114	240Eh		M3 iron loss coefficient 1	0.00 –10.00%
A115	240Fh		M3 iron loss coefficient 2	0.00 –10.00%
A116	2410h		M3 iron loss coefficient 3	0.00 –10.00%
A117	2411h		M3 magnetic saturation 1	0.0– 93.8 –100.0%
A118	2412h		M3 magnetic saturation 2	0.0– 87.5 –100.0%
A119	2413h		M3 magnetic saturation 3	0.0– 75.0 –100.0%
A120	2414h		M3 magnetic saturation 4	0.0– 62.5 –100.0%
A121	2415h		M3 magnetic saturation 5	0.0– 50.0 –100.0%
A122	2416h		M3 secondary time constant	0.001 –9.999s
A123	2417h		M3 induced voltage coefficient	0 –999V
A124	2418h		M3 R2 correction coefficient 1	0.500– 1.000 –5.000
A125	2419h		M3 R2 correction coefficient 2	0.500– 1.000 –5.000
A126	241Ah		M3 R2 correction coefficient 3	0.010– 1.000 –5.000
A127	241Bh		M3 exciting current correction coefficient	0.000 –5.000
A128	241Ch		M3 ACR-P gain	0.1– 1.0 –20.0
A129	241Dh		M3 ACR-I time	0.1– 1.0 –100.0ms
A130	241Eh		M3 PG pulse number	100– 1024 –60000
A131	241Fh	241(F1h)	M3 thermistor selection	0– 1 –3
A132	2420h	242(F2h)	M3 electronic thermal overload relay (Select)	0 –2
A133	2421h	243(F3h)	M3 electronic thermal overload relay (Level)	0.01 –99.99A 100.0–999.9A 1000–2000A
A134	2422h	244(F4h)	M3 electronic thermal overload relay (Thermal time constant)	0.5 –75.0min
A151	2433h		M3 external PG correction coefficient	0000– 4000 –4FFF
A152	2434h		M3 online auto tuning	0 –1
A153	2435h	232(E8h)	M3 maximum output voltage / Maximum voltage limit value	80 –999V
A154	2436h	239(EFh)	M3 slip compensation control	-20.000– 0.000 –5.000Hz
A155	2437h	240(F0h)	M3 torque boost	0.0 –20.0
A156	2438h		M3 current vibration ppressing gain	0.00– 0.20 –1.00
A159	243Bh		M3 ABS signal input definition	0 –16
A160	243Ch		M3 magnetic pole position offset	0.0 –359.9
A161	243Dh		M3 salient pole ratio (%Xq/%Xd)	1.000 –3.000
A164	2440h		M3 overcurrent protection level	0.00 ,0.01–2000A

You can change the setting of the functions indicated with during operation. Stop the operation before changing other functions.

*1: Soon to be supported

O:Optional Functions

Function code	Communications address 485No.	Link No.	Name	Setting range
o01	601h	F5h	DIA function selection	0 –1
o02	602h	F6h	DIB function selection	0 –1
o03	603h		DIA BCD input setting	99– 1000 –7999
o04	604h		DIB BCD input setting	99– 1000 –7999
o05	605h		PG (PD) option setting (feedback pulse selection)	0 –2

Function setting

Function code	Communications address 485No.	Communications address Link No.	Name	Setting range
o06	606h		PG(LD) option setting Digital line speed detection definition (encoder pulse number)	100–1024–60000P/R
o07	607h		PG(LD)option setting Digital line speed detection definition (detection pulse correction 1)	1–1000–9999
o08	608h		PG(LD)option setting Digital line speed detection definition (detection pulse correction 2)	1–1000–9999
o09	609h		M1 ABS signal input definition	0–16
o10	60Ah	247(F7h)	M1 magnetic pole position offset	0.0–359.9
o11	60Bh		M1 salient pole ratio (%Xq/%Xd)	1.000–3.000
o12	60Ch	248(F8h)	PG(PR) pulse train option setting Command pulse selection	0–1
o13	60Dh	249(F9h)	PG(PR) pulse train option setting Pulse train input format selection	0–2
o14	60Eh	250(FAh)	PG(PR) pulse train option setting Command pulse correction 1	1–1000–9999
o15	60Fh		PG(PR) pulse train option setting Command pulse correction 2	1–1000–9999
o16	610h		PG(PR) pulse train option setting APR gain 1	0.1–1.0–999.9(times)
o17	611h		PG(PR) pulse train option setting F/F gain 1	0.0–1.5(times)
o18	612h		PG(PR) pulse train option setting Deviation over width	0–65535 pulse
o19	613h	253(FDh)	PG(PR) pulse train option setting Deviation zero width	0–20–1000pulse
o29	61Dh		Operation continuing signal mode selection on alarm	0–2
o30	61Eh		Operation at communication error	0–9
o31	61Fh		Operation time at communication error	0.01–0.10–20.00s
o32	620h		Transmission format	0–4
o33	621h		Multiwinding system	0–1
o34	622h		Number of multiwinding system slave stations	1–5
o50	632h		Multiwinding system (MWS) station no. setting	0–9

L:Lift Functions

Function code	Communications address 485No.	Communications address Link No.	Name	Setting range
L01	901h		Password data 1	0–9999
L02	902h		Password data 2	0–9999
L03	903h		Elevating machine rated speed	0.0–100.0–999.9m/min
L04	904h		Fixed S-curve pattern	0–2
L05	905h		S-curve setting 1	0–50%
L06	906h		S-curve setting 2	0–50%
L07	907h		S-curve setting 3	0–50%
L08	908h		S-curve setting 4	0–50%
L09	909h		S-curve setting 5	0–50%
L10	90Ah		S-curve setting 6	0–50%
L11	90Bh		S-curve setting 7	0–50%
L12	90Ch		S-curve setting 8	0–50%
L13	90Dh		S-curve setting 9	0–50%
L14	90Eh		S-curve setting 10	0–50%
L15	90Fh		Reserved	0–1

You can change the setting of the functions indicated with during operation. Stop the operation before changing other functions.

indicates the factory setting.

U:User Functions

Function code	Communications address 485No.	Communications address Link No.	Name	Setting range
U01	B01h	219(DBh)	USER P1	-32768–0–32767
U02	B02h	220(DCh)	USER P2	-32768–0–32767
U03	B03h	221(DDh)	USER P3	-32768–0–32767
U04	B04h	222(DEh)	USER P4	-32768–0–32767
U05	B05h	223(DFh)	USER P5	-32768–0–32767
U06	B06h	224(E0h)	USER P6	-32768–0–32767
U07	B07h	225(E1h)	USER P7	-32768–0–32767
U08	B08h	226(E2h)	USER P8	-32768–0–32767
U09	B09h	227(E3h)	USER P9	-32768–0–32767
U10	B0Ah	228(E4h)	USER P10	-32768–0–32767
U11	B0Bh		USER P11	-32768–0–32767
U12	B0Ch		USER P12	-32768–0–32767
U13	B0Dh		USER P13	-32768–0–32767
U14	B0Eh		USER P14	-32768–0–32767
U15	B0Fh		USER P15	-32768–0–32767
U16	B10h		USER P16	-32768–0–32767
U17	B11h		USER P17	-32768–0–32767
U18	B12h		USER P18	-32768–0–32767
U19	B13h		USER P19	-32768–0–32767
U20	B14h		USER P20	-32768–0–32767
U21	B15h		USER P21	-32768–0–32767
U22	B16h		USER P22	-32768–0–32767
U23	B17h		USER P23	-32768–0–32767
U24	B18h		USER P24	-32768–0–32767
U25	B19h		USER P25	-32768–0–32767
U26	B1Ah		USER P26	-32768–0–32767
U27	B1Bh		USER P27	-32768–0–32767
U28	B1Ch		USER P28	-32768–0–32767
U29	B1Dh		USER P29	-32768–0–32767
U30	B1Eh		USER P30	-32768–0–32767
U31	B1Fh		USER P31	-32768–0–32767
U32	B20h		USER P32	-32768–0–32767
U33	B21h		USER P33	-32768–0–32767
U34	B22h		USER P34	-32768–0–32767
U35	B23h		USER P35	-32768–0–32767
U36	B24h		USER P36	-32768–0–32767
U37	B25h		USER P37	-32768–0–32767
U38	B26h		USER P38	-32768–0–32767
U39	B27h		USER P39	-32768–0–32767
U40	B28h		USER P40	-32768–0–32767
U41	B29h		USER P41	-32768–0–32767
U42	B2Ah		USER P42	-32768–0–32767
U43	B2Bh		USER P43	-32768–0–32767
U44	B2Ch		USER P44	-32768–0–32767
U45	B2Dh		USER P45	-32768–0–32767
U46	B2Eh		USER P46	-32768–0–32767
U47	B2Fh		USER P47	-32768–0–32767
U48	B30h		USER P48	-32768–0–32767
U49	B31h		USER P49	-32768–0–32767
U50	B32h		USER P50	-32768–0–32767
U51	B33h		USER P51	-32768–0–32767
U52	B34h		USER P52	-32768–0–32767
U53	B35h		USER P53	-32768–0–32767
U54	B36h		USER P54	-32768–0–32767
U55	B37h		USER P55	-32768–0–32767
U56	B38h		USER P56	-32768–0–32767
U57	B39h		USER P57	-32768–0–32767
U58	B3Ah		USER P58	-32768–0–32767
U59	B3Bh		USER P59	-32768–0–32767
U60	B3Ch		USER P60	-32768–0–32767

Function code	Communications address 485No.	Communications address Link No.	Name	Setting range
U61	B3Dh	75(4Bh)	USER P61/U-Ai1	-32768–0–32767
U62	B3Eh	76(4Ch)	USER P62/U-Ai2	-32768–0–32767
U63	B3Fh	77(4Dh)	USER P63/U-Ai3	-32768–0–32767
U64	B40h	78(4Eh)	USER P64/U-Ai4	-32768–0–32767

The function codes "S" and "M" are codes to access the inverter through links (RS-485 communications, T-Link, SX bus, etc). Therefore, they cannot be operated with the KEYPAD panel.
Though you can access the codes "F", "E", and "C" through these links, these links are specifically designed to access the code "S" for operation and control and the "M" for data monitoring.

S:Serial Communication Functions

Function code	Communications address 485No.	Communications address Link No.	Name	Setting range
S01	701h	1(1h)	Frequency/ speed reference (Setting 1)	-30000 – 30000 r/m : (data)*Nmax/20000
S02	702h	2(2h)	Torque reference	0.01% / 1d
S03	703h	3(3h)	Torque current reference	0.01% / 1d
S04	704h	4(4h)	Magnetic-flux reference	0.01% / 1d
S05	705h	5(5h)	Orientation position reference	0000 – FFFF
S06	706h	6(6h)	Operation method 1	0000 – FFFF
S07	707h	7(7h)	Universal Do	0000 – FFFF
S08	708h	8(8h)	Acceleration time	0.01 – 3600.0 s
S09	709h	9(9h)	Deceleration time	0.01 – 3600.0 s
S10	70Ah	10(Ah)	Torque limiter level 1	0.01% / 1d
S11	70Bh	11(Bh)	Torque limiter level 2	0.01% / 1d
S12	70Ch	12(Ch)	Operation method 2	0000 – FFFF
S13	70Dh		Universal Ao	-16384 – 16384
S16	710Eh		General purpose setting 1	-32768 – 32767
S17	711Fh		General purpose setting 2	-32768 – 32767

M:Monitoring Functions

Function code	Communications address 485No.	Communications address Link No.	Name	Setting range
M01	801h	15(Fh)	Speed setting 4 (ASR input)	-30000 – 30000 r/m : (data)*Nmax/20000
M02	802h	16(10h)	Torque reference	0.01% / 1d
M03	803h	17(11h)	Toque current reference	0.01% / 1d
M04	804h	18(12h)	Magnetic-flux reference	0.01% / 1d
M05	805h	19(13h)	Output frequency reference	0.1Hz / 1d
M06	806h	20(14h)	Detected speed value	-30000 – 30000 r/m : (data)*Nmax/20000
M07	807h	21(15h)	Calculated torque value	0.01% / 1d
M08	808h	22(16h)	Calculated torque current value	0.01% / 1d
M09	809h	23(17h)	Output frequency	0.1Hz / 1d
M10	80Ah	24(18h)	Motor output	0.1kW / 1d
M11	80Bh	25(19h)	Output current rms value	0.1A / 1d
M12	80Ch	26(1Ah)	Output voltage rms value	0.1V / 1d
M13	80Dh	27(1Bh)	Operation method (final command)	0000 – FFFF
M14	80Eh	28(1Ch)	Operation status	0000 – FFFF
M15	80Fh	29(1Dh)	Output terminals Y1 - Y18	0000 – FFFF
M16	810h	30(1Eh)	Latest alarm (multiple, cause)	0000 – 552F
M17	811h	31(1Fh)	Latest alarm data	0000 – 552F
M18	812h	32(20h)	Last alarm data	0000 – 552F
M19	813h	33(21h)	Second last alarm data	0000 – 552F
M20	814h	34(22h)	Accumulated operation time	0 – 65535 h
M21	815h	35(23h)	DC link circuit voltage	1V / 1d
M22	816h	36(24h)	Motor temperature	1℃ / 1d
M23	817h	37(25h)	Type code	0000 – FFFF

You can change the setting of the functions indicated with during operation. Stop the operation before changing other functions.

indicates the factory setting.

Function code	Communications address 485No.	Communications address Link No.	Name	Setting range
M24	818h	38(26h)	Capacity code	0 – 34
M25	819h	39(27h)	Inverter ROM (main control) version	0000 – FFFF
M26	81Ah	40(28h)	Communications error code	0000 – FFFF
M27	81Bh	41(29h)	Alarm (latest): speed reference value	-30000 – 30000 r/m : (data)*Nmax/20000
M28	81Ch	42(2Ah)	Alarm (latest): torque reference value	0.01% / 1d
M29	81Dh	43(2Bh)	Alarm (latest): torque reference value	0.01% / 1d
M30	81Eh	44(2Ch)	Alarm (latest): magnetic-flux reference value	0.01% / 1d
M31	81Fh	45(2Dh)	Alarm (latest): output frequency reference value	0.1Hz / 1d
M32	820h	46(2Eh)	Alarm (latest): detected speed	-30000 – 30000 r/m : (data)*Nmax/20000
M33	821h	47(2Fh)	Alarm (latest): calculated torque	0.01% / 1d
M34	822h	48(30h)	Alarm (latest): calculated torque current	0.01% / 1d
M35	823h	49(31h)	Alarm (latest): output frequency	0.1Hz / 1d
M36	824h	50(32h)	Alarm (latest): motor output	0.1kW / 1d
M37	825h	51(33h)	Alarm (latest): output current rms value	0.1A / 1d
M38	826h	52(34h)	Alarm (latest): output voltage rms value	0.1V / 1d
M39	827h	53(35h)	Alarm (latest): operation method	0000 – FFFF
M40	828h	54(36h)	Alarm (latest): operation status	0000 – FFFF
M41	829h	55(37h)	Alarm (latest): output signal	0000 – FFFF
M42	82Ah	56(38h)	Alarm (latest): accumulated operation time	0 – 65535 h
M43	82Bh	57(39h)	Alarm (latest): DC link voltage	1V / 1d
M44	82Ch	58(3Ah)	Alarm (latest): inverter internal temperature	1℃ / 1d
M45	82Dh	59(3Bh)	Alarm (latest): heat sink temperature	1℃ / 1d
M46	82Eh	60(3Ch)	Main circuit capacitor capacity	0 – 100 %
M47	82Fh	61(3Dh)	PC board capacitor life	0 – 65535(10h)
M48	830h	62(3Eh)	Cooling fan life	0 – 65535(10h)
M49	831h	63(3Fh)	Speed setting 1 (before multistep speed command)	-30000 – 30000 r/m : (data)*Nmax/20000
M50	832h	64(40h)	Speed setting 2 (before calculation of accel./decel.)	-30000 – 30000 r/m : (data)*Nmax/20000
M51	833h	65(41h)	Speed setting 3 (after speed limit)	-30000 – 30000 r/m : (data)*Nmax/20000
M52	834h	66(42h)	Control output 1	0000 – FFFF
M53	835h	67(43h)	Control output 2	0000 – FFFF
M54	836h	68(44h)	Control output 3	0000 – FFFF
M55	837h	69(45h)	Option monitor 1	0000 – FFFF
M56	838h	70(46h)	Option monitor 2	0000 – FFFF
M57	839h	71(47h)	Option monitor 3	0 – 65535
M58	83Ah	72(48h)	Option monitor 4	0 – 65535
M59	83Bh	73(49h)	Option monitor 5	-32768 – 32767
M60	83Ch	74(4Ah)	Option monitor 6	-32768 – 32767
M61	83Dh		Current date: year/month	0000 to FFFF Upper 2-digit: year, lower 2-digit: month
M62	83Eh		Current date: day/time	0000 to FFFF Upper 2-digit: day, lower 2-digit: time
M63	83Fh		Current date: min/sec	0000 to FFFF Upper 2-digit: minute, lower 2-digit: second
M64	840h		Alarm (latest): occurrence date: year/month	0000 to FFFF Upper 2-digit: year, lower 2-digit: month
M65	841h		Alarm (latest): occurrence date: day/time	0000 to FFFF Upper 2-digit: day, lower 2-digit: time
M66	842h		Alarm (latest): occurrence date: min/sec	0000 to FFFF Upper 2-digit: minute, lower 2-digit: second
M67	843h		Alarm (latest): canceled date: year/month	0000 to FFFF Upper 2-digit: year, lower 2-digit: month
M68	844h		Alarm (latest): canceled date: day/time	0000 to FFFF Upper 2-digit: day, lower 2-digit: time
M69	845h		Alarm (latest): canceled date: min/sec	0000 to FFFF Upper 2-digit: minute, lower 2-digit: second
M70	846h		Alarm (latest): extension identification	0 – 1
M71	847h		Multiple alarm (latest): no.2	0000 – FFFF

Function setting

indicates the factory setting.

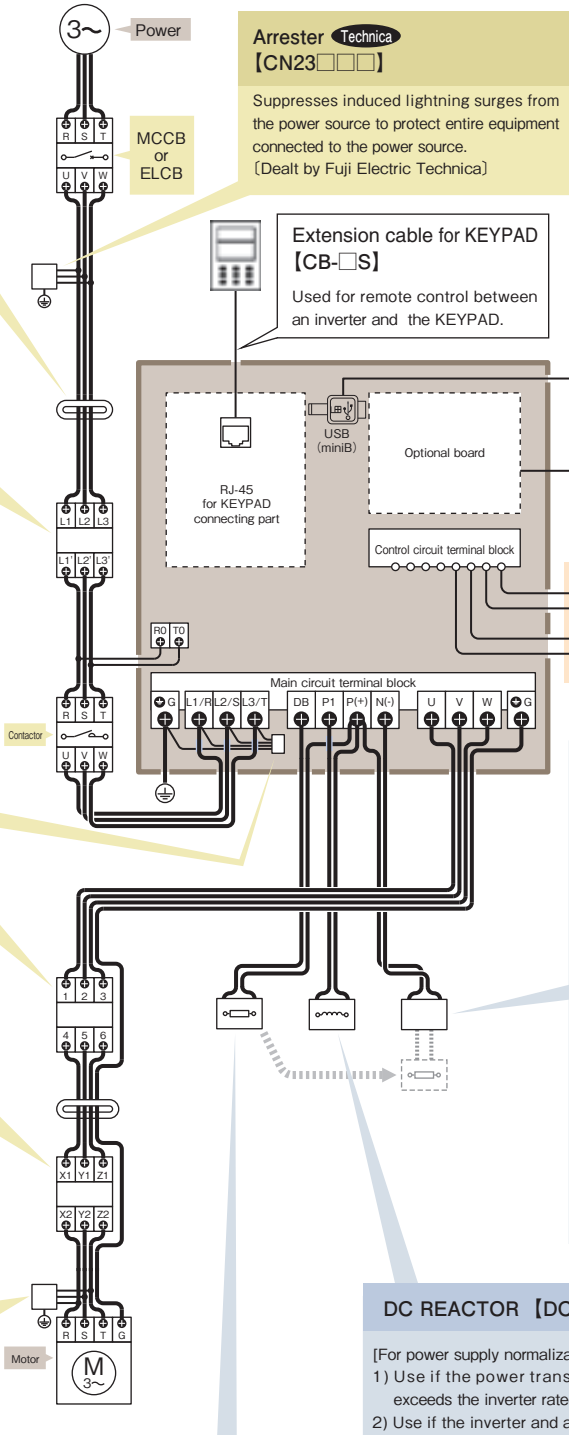
Function code	Communications address 485No.	Link No.	Name	Setting range
M72	848h		Multiple alarm (latest): no.3	0000 – FFFF
M73	849h		Multiple alarm (latest): no.4	0000 – FFFF
M74	84Ah		Multiple alarm (latest): no.5	0000 – FFFF
M75	84Bh		Alarm (latest): sub code	0000 – FFFF
M76	84Ch		Alarm (latest): maximum speed	0 – 65535 r/m
M77	84Dh		Alarm (latest): input power	0 – 65535 kW
M78	84Eh		Alarm (latest): motor temperature	1℃ / 1d
M79	84Fh		Alarm (latest): operation status 2 (a)	0000 – FFFF
M80	850h		Alarm (latest): operation status 2 (b)	0000 – FFFF
M81	851h		Alarm (latest): operation method (communications)	0000 – FFFF
M82	852h		Alarm (latest): operation method 2 (communications)	0000 – FFFF
M83	853h		Alarm (latest): output signal 2	0000 – FFFF
M84	854h		Alarm (latest): M1 number of starts	0 – 65535 (times)
M85	855h		Alarm (latest): M2 number of starts	0 – 65535 (times)
M86	856h		Alarm (latest): M3 number of starts	0 – 65535 (times)
M87	857h		Alarm (latest): EN terminal input	0000 – FFFF
M91	85Bh		Communications error flag 1	0000 – FFFF
M92	85Ch		Communications error flag 2	0000 – FFFF
M93	85Dh		Minor fault (latest)	0 – 255
M94	85Eh		Minor fault (last)	0 – 255
M95	85Fh		Minor fault (second last)	0 – 255
M96	860h		Minor fault (third last)	0 – 255
M98	862h		EN terminal input	0000 – FFFF
M100	2900h		Effective parameter set condition	0000 – FFFF
M101	2901h		Operation method 2 (final command)	0000 – FFFF
M102	2902h		Load factor	-327.68 – 327.67 %
M103	2903h		Input power	0.00 – 655.35 %
M104	2904h		Operation status 2 (a)	0000 – FFFF
M105	2905h		Operation status 2 (b)	0000 – FFFF
M106	2906h		Load rotation detected speed	-30000 – 30000 r/m
M107	2907h		Line detected speed	-30000 – 30000 r/m
M108	2908h		PID command value	-327.68 – 327.67 %
M109	2909h		PID feedback value	-327.68 – 327.67 %
M110	290Ah		PID output value	-327.68 – 327.67 %
M112	290Ch		Motor 1 electronic internal thermal part Integrated value output	0 – 65535 %
M113	290Dh		Motor 2 electronic internal thermal part Integrated value output	0 – 65535 %
M114	290Eh		Motor 3 electronic internal thermal part Integrated value output	0 – 65535 %
M115	290Fh		Integral power consumption	0.000 – 9999
M116	2910h		Integral power data	0.000 – 9999
M117	2911h		Integral power consumption (middle-order: 16 bit)	0000 – FFFF
M118	2912h		Integral power consumption (high-order: 16 bit)	0000 – FFFF
M119	2913h		Inverter internal temperature (real-time value)	-32768 – 32767 ℃
M120	2914h		Heat sink temperature (real-time value)	-32768 – 32767 ℃
M121	2915h		Main circuit capacitor life (elapsed time)	0 – 65535 [10h]
M123	2917h		M1 number of starts	0 – 65535 (times)
M124	2918h		M2 number of starts	0 – 65535 (times)
M125	2919h		M3 number of starts	0 – 65535 (times)
M126	291Ah		M1 motor accumulated operation time	0 – 65535 [10h]
M127	291Bh		M2 motor accumulated operation time	0 – 65535 [10h]
M128	291Ch		M3 motor accumulated operation time	0 – 65535 [10h]
M129	291Dh		Running operation command (communications)	0000 – FFFF
M130	291Eh		Torque bias	-32768 – 32767
M131	291Fh		Magnetic pole position signal	-32767 – 32767
M132	2920h		Universal AO1	0000 – FFFF
M134	2922h		Control input 1	0000 – FFFF
M135	2923h		Control input 2	0000 – FFFF
M136	2924h		Control input 3	0000 – FFFF
M137	2925h		Control input 4	0000 – FFFF
M138	2926h		Control input 5	0000 – FFFF
M139	2927h		Control input 6	0000 – FFFF
M140	2928h		Control input 7	0000 – FFFF
M141	2929h		Control input 8	0000 – FFFF
M142	292Ah		Control output 4	0000 – FFFF
M143	292Bh		Control output 5	0000 – FFFF
M144	292Ch		Control output 6	0000 – FFFF
M147	292Fh		Exciting current command	-327.68 – 327.67 %
M148	2930h		Exciting current detection	-327.68 – 327.67 %
M149	2931h		Magnetic-flux calculation	0.00 – 655.35 %
M161	293Dh		Ai adjustment value (12)	-32768 – 32767
M162	293Eh		Ai adjustment value (Ai1)	-32768 – 32767
M163	293Fh		Ai adjustment value (Ai2)	-32768 – 32767
M164	2940h		Ai adjustment value (Ai3)	-32768 – 32767
M165	2941h		Ai adjustment value (Ai4)	-32768 – 32767
M166	2942h		Input signal (terminal)	0000 – FFFF
M167	2943h		Analog input signal (12)	-32768 – 32767
M168	2944h		Analog input signal (Ai1)	-32768 – 32767
M169	2945h		Analog input signal (Ai2)	-32768 – 32767
M170	2946h		Analog output signal (Ao1)	-32768 – 32767
M171	2947h		Analog output signal (Ao2)	-32768 – 32767
M172	2948h		Analog output signal (Ao3)	-32768 – 32767
M173	2949h		AIO I/O status 1 (Ai3)	-32767 – 32767
M174	294Ah		AIO I/O status 1 (Ai4)	-32767 – 32767
M175	294Bh		AIO I/O status 1 (Ao4)	-32767 – 32767
M176	294Ch		AIO I/O status 1 (Ao5)	-32767 – 32767
M177	294Dh		PG(SD) input pulse	-32768 – 32767
M178	294Eh		PG(LD) input pulse	-32768 – 32767
M179	294Fh		PG(PR) input pulse	-32768 – 32767
M180	2950h		PG(PD) input pulse	-32768 – 32767
M181	2951h		DIOA I/O status (terminal)	0000 – FFFF
M182	2952h		DIOA I/O status (via communications)	0000 – FFFF
M183	2953h		DIOB option input status	0000 – FFFF
M184	2954h		DIOB option output status	0000 – FFFF
M220	2A14h		Load adaptive speed limit value	-30000 – 30000 r/m
M221	2A15h		Lifting weight calculated result monitor	0 – 65535 kg
M222	2A16h		Travel torque calculation monitor	0 – 65535 %

You can change the setting of the functions indicated with during operation. Stop the operation before changing other functions.

Options

Option guides

For main power input and inverter output



Ferrite ring for reducing radio noise 【ACL-40B, ACL-74B, F200160】

Used to reduce radio noise. Suppressive effect to the frequency band is available by approximately 1MHz or more. This is appropriate as a simple measure against noise since it affects broad range in the frequency band.
It is recommended to insert it on the power supply side if the cable length between a motor and an inverter is short (roughly 20m or less) or on the output side if the cable length exceeds 20m.

EMC compliance filter (coming soon) 【EFL-□□□, FS□□, FN□□】

Dedicated filter to comply with the European EMC Directive (Emission). Install the filter while referring to the details in the installation manual.

Power filter for input circuit Technica **【RNF□C□□-□□】**

This filter can be used for the same purpose as the EMC compliance filter, but is not an EMC compliance.

Filter capacitor for reducing radio noise Technica **【NFM□□M315KPD□】**

Used to reduce radio noise. This is effective for the AM radio frequency band.
*Do not use it on the inverter output side.
[Made by Nippon Chemi-con, dealt by Fuji Electric Technica]

Power filter for output circuit Technica **【RNF□S□□-□□】**

This will become more effective in noise reduction if used together with the power filter for input circuit.

Output circuit filter 【OFL-□□□-4A】

Connected to the output of an inverter to:
•Suppress fluctuations of motor terminal voltage.
•Prevent damages to the motor insulation due to surge voltage in 400V series inverter.
*This filter is not limited by carrier frequency. Also, motor can be tuned with this option in the installed state.

Surge supperession unit 【SSU □□□TA-NS】

Surge voltage is generated if the cable between an inverter and a motor is several ten meters long. This product suppresses the surge voltage, preventing the motor from being damaged.

Surge killer

Absorbs surge voltage coming from L-load of magnetic contactor and solenoid valve to protect electronic devices from malfunctioning.

Surge absorber Technica
(Connect in parallel to the coil that is a generation source of surge.)

[S2-A-0 (for magnetic contactor and solenoid valve)]
[S1-B-0 (for mini control relay and timer)]

Surge killer for L-load
(Connect to the power circuit that is a generation source of surge.)

【FSL-323 (for 3-phase)】
【FSL-123 (for single -phase)】

* The items indicated with " Technica " are dealt by Fuji Electric Technica.

Arrester Technica **【CN23□□□】**

Suppresses induced lightning surges from the power source to protect entire equipment connected to the power source.
〔Dealt by Fuji Electric Technica〕

Extension cable for KEYPAD 【CB-□S】

Used for remote control between an inverter and the KEYPAD.

PC loader for Windows Inverter loader software (FRENIC loader)

This software is used to set the function codes of the inverter from a PC, to manage the data. ("WPS-VG1-STR" is available as free download from our website.)

Battery for memory backup, storing trace back memory and calendar function 【OPK-BP】
22kW: optional, 30kW or more: standard equipment

Braking unit 【BU□□-□C】

To be used together with a braking resistor to increase the inverter braking performance.

Power regenerative PMW converter, RHC series 【RHC□□-□C】

Used for suppressing power source harmonics of inverters. It is also equipped with a power supply regenerative function to drastically increase braking capability and reduce energy consumption.
Use in combination with dedicated reactors for the RHC series.

Dedicated filter for the RHC series

Dedicated filter for the RHC series is used if other electronic equipment is connected to the same power source.
*Use in combination with dedicated filter reactors, filter capacitors and filter resistors.

Braking resistor 【DB□□V-□□】

Increases braking capability for highly frequent stopping and large moment of inertia. When used together with a braking unit, connect this to the connection terminal of the braking unit.

DC REACTOR 【DCR□-□□□】

[For power supply normalization]
1) Use if the power transformer capacity is 500kVA or more and exceeds the inverter rated capacity by 10 times.
2) Use if the inverter and a thyristor converter are connected with the same transformer.
*Check if the thyristor converter uses a commutation reactor. If not, an AC reactor must be connected to the power supply side.
3) Connect to prevent trips when trip occurs due to opening/closing of the phase-advancing capacitor for the power supply lines.
4) Use if the voltage unbalance exceeds 2%.

[For improving the input power-factor and reducing harmonics]
- Used to reduce the input harmonic current (correcting power-factor)

Peripheral and structure options

Attachment for external cooling
The attachment to install the heat sink part of the inverter outside the panel. [PBVG7-7.5 (for up to 7.5kW)] [PB-F1-30 (for 11 to 22kW)]

Options

Option cards

Category	Name	Type	Switch with SW on the PCB.	Specifications	Remarks
Analog card	Synchronized operation card	OPC-VG1-SN		Synchronizing interface circuits for dancer control	coming soon
	F/V converter	OPC-VG1-FV		F/V converter	coming soon
	Aio extension card	OPC-VG1-AIO		Extension card of Ai 2 points + Ao 2 points	○
	Ai extension card	OPC-VG1-AI		Extension card of Ai 2 points	○
Digital card (for 8-bit bus)	Di interface card	OPC-VG1-DI	OPC-VG1-DI(A)	16-bit Di of binary or 4-digit BCD + sign	○
			OPC-VG1-DI(B)	For setting the speed, torque and the torque current reference.	○
	Dio extension card	OPC-VG1-DIO	OPC-VG1-DIO(A)	Extension of DI(4 bits) and Do(8 bits) for function selecting.Dio option card for direct landing control. Di X 16 bit + Do X 10 bit	○
			OPC-VG1-DIO(B)	UPAC exclusive use	coming soon
	PG interface extension card	OPC-VG1-PG	OPC-VG1-PG(SD)	+5V line drivers type, voltage output PGs (A,B and Z-phase signals). Used for detecting motor speed, line speed, position reference and position detection.	○
			OPC-VG1-PG(LD)		○
			OPC-VG1-PG(PR)		○
			OPC-VG1-PG(PD)		○
		OPC-VG1-PGo	OPC-VG1-PGo(SD)	Open collector type voltage output PGs (A,B and Z-phase signals). Used for detecting motor speed, line speed, position reference and position detection.	○
			OPC-VG1-PGo(LD)		○
			OPC-VG1-PGo(PR)		○
			OPC-VG1-PGo(PD)		○
		OPC-VG1-SPGT		ABS encoder with 17-bit high resolution	○
	T-Link interface card	OPC-VG1-TL		T-Link interface card	○
	CC-Link interface card	OPC-VG1-CCL		CC-Link compliant card (Ver2.00)	○
	PG card for synchronous motor driving	OPC-VG1-PMPG		+5V line drivers type / A, B + magnetic pole position (max. 4 bits)	○
		OPC-VG1-PMPGo		Open collector type / A, B + magnetic pole position (max. 4 bits)	○
Digital card (for 16-bit bus)	SX bus interface card	OPC-VG1-SX		SX bus interface card	○
	E-SX bus interface card	OPC-VG1-ESX		E-SX bus interface card	○
	User Programmable Application Card	OPC-VG1-UPAC		Technology card	coming soon
Safety card	Function safety card	OPC-VG1-SAFE		Safety standard compliant card	○
Fieldbus interface card	PROFIBUS-DP	OPC-VG1-PDP		PROFIBUS-DP interface card	coming soon
	DeviceNet	OPC-VG1-DEV		DeviceNet interface card	coming soon
Control circuit terminal	Terminal block for high-speed serial communications	OPC-VG1-TBSI		Used for multiple-winding motor drive system, reactor connection system	○
Loader	Inverter support loader	WPS-VG1-STR		For Windows. (Free version)	○
		WPS-VG1-PCL		For Windows. (Paid version)	○
Package software	Tension control software	WPS-VG1-TEN		For Windows. Supplied with inverter support loader (Paid) CD-ROM.	coming soon
	Dancer control software	WPS-VG1-DAN			coming soon
	Position control software	WPS-VG1-POS			coming soon

Cable

Category	Name	Type	Length(m)	Specifications
Cable	Extension cable for KEYPAD	CB-5S	5m	Connection cable between an inverter and the KEYPAD panel
		CB-3S	3m	
		CB-1S	1m	

Combination with built-in control option

Category	Maximum installable number			
	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Digital card (8bit bus supported)	1	1	1	1
Digital card (8bit bus supported)	1	1	0	0
Digital card (16bit bus supported)	1	0	0	1

Restrictions for installing built-in option cards

(1) When you use OPC-VG1-PG for detecting motor speed, the input from the terminals (PA, PB) on the control PC board of the main unit is disabled.

(2) When you install OPC-VG1-PMPG, you should select terminals according to the control method. The terminals (PA, PB) on the control PC board of the main unit are enabled if vector control with the induction motor speed sensor is selected. The OPC-VG1-PMPG is enabled if vector control with the synchronous motor speed sensor is selected.

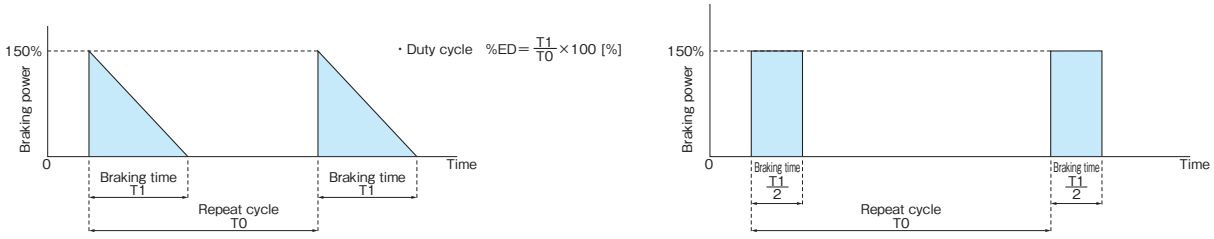
(3) You cannot use OPC-VG1-TL (T-Link interface) and OPC-VG1-CCL (CC-Link interface) simultaneously. If these are used at the same time, the operation procedure error (Er6) will be issued.

(4) You can select how to use OPC-VG1-PG, PGo with the switch setting on the control PC board.
You can install a pair of either OPC-VG1-PG, PGo. If the setting of the switches selecting how to use them are the same, the operation procedure error (Er6) will be issued.

Braking resistor, braking unit (max. 150% torque, 10%ED)

Power supply voltage	Nominal applied motor [kW]	Inverter type HD spec	Braking unit		Braking resistor			Continuous braking (150% torque conversion value)			Repetitive braking (100s or less cycle)	
			Type	Q'ty	Type	Ohmic value	Q'ty	Max. braking torque [%]	Braking time [s]	Discharging capability [kWs]	Duty cycle [%ED]	Average loss [kW]
200V	0.75	FRN0.75VG1S-2J	Built-in inverter		DB2.2V-21B	30Ω	1	150%	10s	16.5	10%ED	0.165
	1.5	FRN1.5VG1S-2J										
	2.2	FRN2.2VG1S-2J										
	3.7	FRN3.7VG1S-2J			DB3.7V-21B	24Ω	1			27.75		0.2775
	5.5	FRN5.5VG1S-2J			DB5.5V-21B	16Ω	1			41.25		0.4125
	7.5	FRN7.5VG1S-2J			DB7.5V-21B	12Ω	1			56.25		0.5625
	11	FRN11VG1S-2J			DB11V-21B	8Ω	1			82.5		0.825
	15	FRN15VG1S-2J			DB15V-21B	6Ω	1			112.5		1.125
	18.5	FRN18.5VG1S-2J			DB18.5V-21B	4.5Ω	1			138.75		1.3875
	22	FRN22VG1S-2J			DB22V-21B	4Ω	1			165		1.65
	30	FRN30VG1S-2J			DB30V-21B	2.5Ω	1			225		2.25
	37	FRN37VG1S-2J			DB37V-21B	2.25Ω	1			277.5		2.775
	45	FRN45VG1S-2J			DB45V-21B	2Ω	1			337.5		3.375
	55	FRN55VG1S-2J			DB55V-21C	1.6Ω	1			412.5		4.125
	75	FRN75VG1S-2J	BU55-2C	2	DB75V-21C	2.4/2Ω	1			562.5		5.625
	90	FRN90VG1S-2J	BU90-2C	2	DB90V-21C	2/2Ω	1			675		6.75
400V	3.7	FRN3.7VG1S-4J	Built-in inverter		DB3.7V-41B	96Ω	1	150%	10s	27.75	10%ED	0.2775
	5.5	FRN5.5VG1S-4J			DB5.5V-41B	64Ω	1			41.25		0.4125
	7.5	FRN7.5VG1S-4J			DB7.5V-41B	48Ω	1			56.25		0.5625
	11	FRN11VG1S-4J			DB11V-41B	32Ω	1			82.5		0.825
	15	FRN15VG1S-4J			DB15V-41B	24Ω	1			112.5		1.125
	18.5	FRN18.5VG1S-4J			DB18.5V-41B	18Ω	1			138.75		1.3875
	22	FRN22VG1S-4J			DB22V-41B	16Ω	1			165		1.65
	30	FRN30VG1S-4J			DB30V-41B	10Ω	1			225		2.25
	37	FRN37VG1S-4J			DB37V-41B	9Ω	1			277.5		2.775
	45	FRN45VG1S-4J			DB45V-41B	8Ω	1			337.5		3.375
	55	FRN55VG1S-4J			DB55V-41C	6.5Ω	1			412.5		4.125
	75	FRN75VG1S-4J			DB75V-41C	4.7Ω	1			562.5		5.625
	90	FRN90VG1S-4J			DB90V-41C	3.9Ω	1			675		6.75
	110	FRN110VG1S-4J			DB110V-41C	3.2Ω	1			825		8.25
	132	FRN132VG1S-4J			DB132V-41C	2.6Ω	1			990		9.9
	160	FRN160VG1S-4J			DB160V-41C	2.2Ω	1			1200		12.0
	200	FRN200VG1S-4J	BU220-4C	2	DB200V-41C	3.5/2Ω	1			1500		15.0
	220	FRN220VG1S-4J			DB220V-41C	3.2/2Ω	1			1650		16.5
	280	FRN280VG1S-4J			DB160V-41C	2.2/2Ω	2			2100		21.0
	315	FRN315VG1S-4J			DB160V-41C	2.2/2Ω	2			2363		23.6
	355	FRN355VG1S-4J	BU220-4C	3	DB132V-41C	2.6/3Ω	3			2663		26.6
	400	FRN400VG1S-4J			DB132V-41C	2.6/3Ω	3			3000		30.0
	500	FRN500VG1S-4J		4	DB132V-41C	2.6/4Ω	4			3750		37.5
	630	FRN630VG1S-4J			DB160V-41C	2.2/4Ω	4			4725		47.3

NOTES:
1) The duty cycle [%ED] are calculated as the 150% torque braking used for deceleration as described below.
2) Two braking resistors are required for each of DB160V-41C, DB200V-41C, or DB220V-41C.
3) When connecting three braking units or more in parallel, refer to the supplement document of the DB Unit instruction manual (notes in connecting multiple units) INR-HF51614.



[Selection procedure]
All three conditions listed below must be satisfied simultaneously.
① The maximum braking torque does not exceed the value shown on the table.
② The energy discharged in the resistor for each braking (the area of the triangle shown in the above figure) does not exceed the discharging capability [kWs] on the table.
③ The average loss (energy discharged in the resistor divided by the braking interval) does not exceed the average loss [kW] shown on the table.

Options

Braking resistor (max.150% torque, 10%ED)

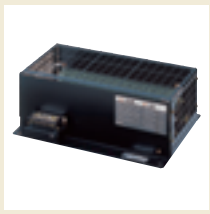


Fig. A

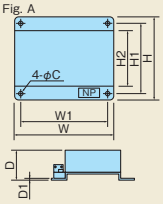
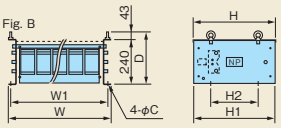


Fig. B



200V Series

Type	Fig.	Dimensions [mm]								Approx. weight [kg]
		W	W1	H	H1	H2	D	D1	C	
DB2.2V-21B	A	330	298	242	210	165	140	1.6	8	4
DB3.7V-21B		400	368	280	248	203	140	1.6	8	5
DB5.5V-21B		400	368	280	248	203	140	1.6	8	5
DB7.5V-21B		400	368	480	448	377	140	1.6	10	6
DB11V-21B		400	368	480	448	377	140	1.6	10	7
DB15V-21B		400	368	660	628	557	140	1.6	10	10
DB18.5V-21B		400	368	660	628	557	140	1.6	10	10
DB22V-21B		400	368	660	628	557	240	1.6	10	13
DB30V-21B		400	368	660	628	557	240	1.6	10	18
DB37V-21B		405	368	750	718	647	240	1.6	10	22
DB45V-21B		405	368	750	718	647	340	1.6	10	26
DB55V-21C	B	450	420	440	430	250	283	–	12	35
DB75V-21C		600	570	440	430	250	283	–	12	33
DB90V-21C		700	670	440	430	250	283	–	12	43

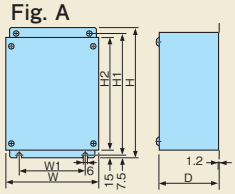
400V Series

Type	Fig.	Dimensions [mm]								Approx. weight [kg]
		W	W1	H	H1	H2	D	D1	C	
DB3.7V-41B	A	420	388	280	248	203	140	1.6	8	5
DB5.5V-41B		420	388	480	448	377	140	1.6	10	7
DB7.5V-41B		420	388	480	448	377	140	1.6	10	7
DB11V-41B		420	388	480	448	377	140	1.6	10	8
DB15V-41B		420	388	660	628	557	140	1.6	10	11
DB18.5V-41B		420	388	660	628	557	140	1.6	10	11
DB22V-41B		420	388	660	628	557	240	1.6	10	14
DB30V-41B		420	388	660	628	557	240	1.6	10	19
DB37V-41B		425	388	750	718	647	240	1.6	10	21
DB45V-41B		425	388	750	718	647	340	1.6	10	26
DB55V-41C	B	550	520	440	430	250	283	–	12	26
DB75V-41C		550	520	440	430	250	283	–	12	30
DB90V-41C		650	620	440	430	250	283	–	12	41
DB110V-41C		750	720	440	430	250	283	–	12	57
DB132V-41C		750	720	440	430	250	283	–	12	43
*DB160V-41C		600	570	440	430	250	283	–	12	37(×2)
*DB200V-41C		725	695	440	430	250	283	–	12	50(×2)
*DB220V-41C		725	695	440	430	250	283	–	12	51(×2)

* For DB160V-41C, DB200V-41C, and DB220V-41C, a pair of resistors of the same type is used.
Be sure to secure the space for installation. A pair of resistors is shipped for the order of one unit.

Braking unit (BU□□-□)

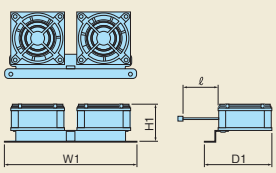
Fig. A



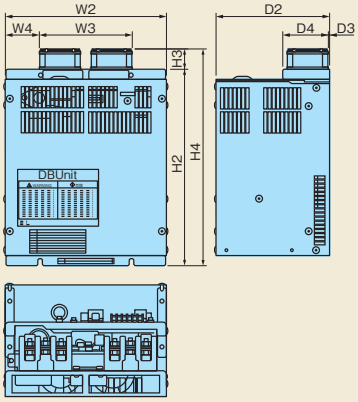
Voltage	Type	Fig.	Dimensions [mm]						Approx. weight [kg]
			W	W1	H	H1	H2	D	
200V series	BU55-2C	A	230	130	240	225	210	160	6
	BU90-2C	A	250	150	370	355	340		9
400V series	BU220-4C	A	250	150	450	435	420	160	13

Fan unit for braking unit (BU-F)

■Fan unit



■Braking unit + Fan unit



The duty cycle [%ED] of the model with an external braking unit is increased from 10%ED to 30%ED by using this option.

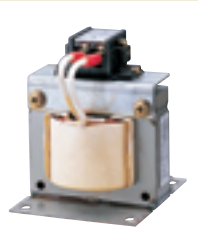
[Fan unit]

Type	Dimensions [mm]			
	W1	H1	D1	ℓ (Fan power supply cable)
BU-F	149	44	76	320

[Braking unit + Fan unit]

Voltage	Type	Dimensions [mm]								
		W2	W3	W4	H2	H3	H4	D2	D3	D4
200V series	BU55-2C+BU-F	230	135	47.5	240	30	270	160	1.2	64
	BU90-2C+BU-F	250		57.5	370		400			
400V series	BU220-4C+BU-F	250	135	57.5	450	30	480	160	1.2	64

DC REACTOR (DCR□-□□□)



*The DC REACTOR is provided as standard in standard inverters of 75kW or more.

Fig. A

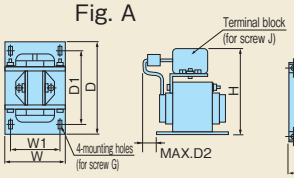


Fig. B

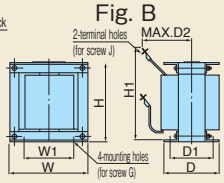


Fig. C

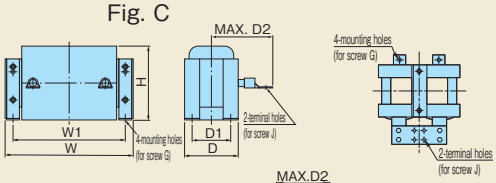


Fig. D

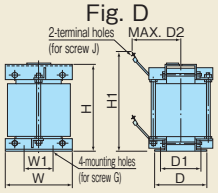


Fig. E

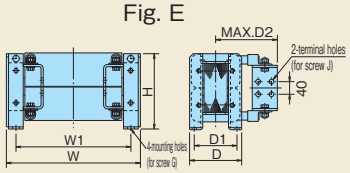
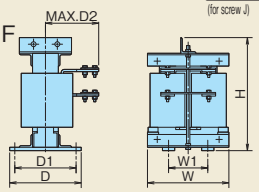


Fig. F



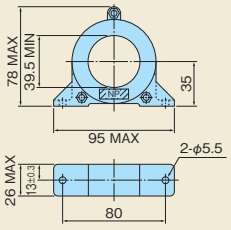
Voltage	Nominal applied motor [kW]	Inverter type			REACTOR type	Fig.	Dimensions [mm]									Approx. weight [kg]
		HD	MD	LD			W	W1	D	D1	D2	G	H	H1	J	
200V series	0.75	FRN0.75VG1S-2J	—	—	DCR2-0.75	A	66	56	90	72	20	M4(5.2×8)	94	—	M4	1.4
	1.5	FRN1.5VG1S-2J	—	—	DCR2-1.5		66	56	90	72	20	M4(5.2×8)	94	—	M4	1.6
	2.2	FRN2.2VG1S-2J	—	—	DCR2-2.2		86	71	100	80	10	M5(6×9)	110	—	M4	1.8
	3.7	FRN3.7VG1S-2J	—	—	DCR2-3.7		86	71	100	80	20	M5(6×9)	110	—	M4	2.6
	5.5	FRN5.5VG1S-2J	—	—	DCR2-5.5		111	95	100	80	20	M6(7×11)	130	—	M5	3.6
	7.5	FRN7.5VG1S-2J	—	—	DCR2-7.5		111	95	100	80	23	M6(7×11)	130	—	M5	3.8
	11	FRN11VG1S-2J	—	—	DCR2-11		111	95	100	80	24	M6(7×11)	137	—	M6	4.3
	15	FRN15VG1S-2J	—	—	DCR2-15		146	124	120	96	15	M6(7×11)	180	—	M8	5.9
	18.5	FRN18.5VG1S-2J	—	—	DCR2-18.5		146	124	120	96	25	M6(7×11)	180	—	M8	7.4
	22	FRN22VG1S-2J	—	—	DCR2-22A		146	124	120	96	25	M6(7×11)	180	—	M8	7.5
	30	FRN30VG1S-2J	—	—	DCR2-30B	B	152	90	156	116	115	M6(Φ8)	130	190	M10	12
	37	FRN37VG1S-2J	—	FRN30VG1S-2J	DCR2-37B		171	110	151	110	115	M6(Φ8)	150	200	M10	14
			—		DCR2-37C	C	210	185	101	81	125	M6(7×13)	125	—	M10	7.4
	45	FRN45VG1S-2J	—	FRN37VG1S-2J	DCR2-45B	B	171	110	166	125	120	M6(Φ8)	150	200	M10	16
			—		DCR2-45C	C	210	185	106	86	135	M6(7×13)	125	—	M12	8.4
	55	FRN55VG1S-2J	—	FRN45VG1S-2J	DCR2-55B	D	190	160	131	90	100	M6(Φ8)	210	250	M12	16
			—		DCR2-55C	C	255	225	96	76	140	M6(7×13)	145	—	M12	11
	75	FRN75VG1S-2J	—	FRN55VG1S-2J	DCR2-75C	C	255	225	106	86	145	M6(7×13)	145	—	M12	12
	90	FRN90VG1S-2J	—	FRN75VG1S-2J	DCR2-90C		255	225	116	96	155	M6(7×13)	145	—	M12	14
	110	—	—	FRN90VG1S-2J	DCR2-110C		300	265	116	90	185	M8(10×18)	160	—	M12	17
400V series	3.7	FRN3.7VG1S-4J	—	—	DCR4-3.7	A	86	71	100	80	20	M5(6×9)	110	—	M4	2.6
	5.5	FRN5.5VG1S-4J	—	—	DCR4-5.5		86	71	100	80	20	M5(6×9)	110	—	M4	2.6
	7.5	FRN7.5VG1S-4J	—	—	DCR4-7.5		111	95	100	80	24	M6(7×11)	130	—	M5	4.2
	11	FRN11VG1S-4J	—	—	DCR4-11		111	95	100	80	24	M6(7×11)	130	—	M5	4.3
	15	FRN15VG1S-4J	—	—	DCR4-15		146	124	120	96	15	M6(7×11)	168	—	M5	5.9
	18.5	FRN18.5VG1S-4J	—	—	DCR4-18.5		146	124	120	96	25	M6(7×11)	171	—	M6	7.2
	22	FRN22VG1S-4J	—	—	DCR4-22A		146	124	120	96	25	M6(7×11)	171	—	M6	7.2
	30	FRN30VG1S-4J	—	—	DCR4-30B	B	152	90	157	115	100	M6(Φ8)	130	190	M8	13
	37	FRN37VG1S-4J	—	FRN30VG1S-4J	DCR4-37B	B	171	110	150	110	100	M6(Φ8)	150	200	M8	15
			—		DCR4-37C	C	210	185	101	81	105	M6(7×13)	125	—	M8	7.4
	45	FRN45VG1S-4J	—	FRN37VG1S-4J	DCR4-45B	B	171	110	165	125	110	M6(Φ8)	150	210	M8	18
			—		DCR4-45C	C	210	185	106	86	120	M6(7×13)	125	—	M8	8.4
	55	FRN55VG1S-4J	—	FRN45VG1S-4J	DCR4-55B	B	171	110	170	130	110	M6(Φ8)	150	210	M8	20
			—		DCR4-55C	C	255	225	96	76	120	M6(7×13)	145	—	M10	11
	75	FRN75VG1S-4J	—	FRN55VG1S-4J	DCR4-75C	C	255	225	106	86	125	M6(7×13)	145	—	M10	13
	90	FRN90VG1S-4J	—	FRN75VG1S-4J	DCR4-90C		255	225	116	96	140	M6(7×13)	145	—	M12	15
	110	FRN110VG1S-4J	FRN90VG1S-4J	FRN90VG1S-4J	DCR4-110C		300	265	116	90	175	M8(10×18)	155	—	M12	19
	132	FRN132VG1S-4J	FRN110VG1S-4J	FRN110VG1S-4J	DCR4-132C		300	265	126	100	180	M8(10×18)	160	—	M12	22
	160	FRN160VG1S-4J	FRN132VG1S-4J	FRN132VG1S-4J	DCR4-160C		350	310	131	103	180	M10(12×22)	190	—	M12	26
	200	FRN200VG1S-4J	FRN160VG1S-4J	FRN160VG1S-4J	DCR4-200C		350	310	141	113	185	M10(12×22)	190	—	M12	30
	220	FRN220VG1S-4J	FRN200VG1S-4J	FRN200VG1S-4J	DCR4-220C		350	310	146	118	200	M10(12×22)	190	—	M12	33
	250	—	FRN220VG1S-4J	—	DCR4-250C		350	310	161	133	210	M10(12×22)	190	—	M12	35
	280	FRN280VG1S-4J	—	FRN220VG1S-4J	DCR4-280C		350	310	161	133	210	M10(12×22)	190	—	M16	37
	315	FRN315VG1S-4J	FRN280VG1S-4J	—	DCR4-315C		400	345	146	118	200	M10(12×22)	225	—	M16	40
	355	FRN355VG1S-4J	FRN315VG1S-4J	FRN280VG1S-4J	DCR4-355C	E	400	345	156	128	200	M10(12×22)	225	—	4×M12	49
	400	FRN400VG1S-4J	FRN355VG1S-4J	FRN315VG1S-4J	DCR4-400C		445	385	145	117	213	M10(12×22)	245	—	4×M12	52
	450	—	FRN400VG1S-4J	FRN355VG1S-4J	DCR4-450C		440	385	150	122	215	M10(12×22)	245	—	4×M12	62
	500	FRN500VG1S-4J	—	FRN400VG1S-4J	DCR4-500C		445	390	165	137	220	M10(12×22)	245	—	4×M12	72
	630	FRN630VG1S-4J	—	FRN500VG1S-4J	DCR4-630C	F	285	145	203	170	195	M12(14×20)	480	—	2×M12	75
	710	—	—	FRN630VG1S-4J	DCR4-710C		340	160	295	255	225	M12(Φ15)	480	—	4×M12	95

- The DC Reactor (DCR) in thick-frame are provided as standard (supplied adding to the unit). The DC Reactor (DCR) is provided as standard for FRN55VG1S-2 and FRN55VG1S-4 of the LD specification, but not provided as standard for those units of HD specification.
* The DCR2/4-□□B type is also prepared for the motor with 75kW or higher that are applicable as standard. Contact us for the product separately.

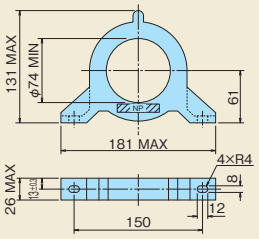
DC Reactor type	Remarks
Input power factor of DCR2/4-□□/□□A/□□B: approx. 90 to 95% This conforms to the Standard Specifications for Public Building Construction Works (for electrical facility works) revised in 2010 which is administrated by Ministry of Land, Infrastructure, Transport and Tourism. (The input power factor is 94% or more when calculated assuming the base frequency is "1" based on the version of 2010.)	The symbol at the end of the type code varies depending on the capacity.
Input power factor of DCR2/4-□□C: approx. 86 to 90%	This can be selected with the inverter of 37kW or more.

Options

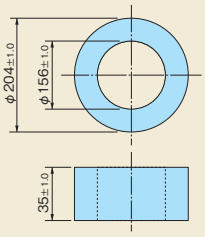
Ferrite ring for reducing radio noise (ACL-40B, ACL-74B, F200160)



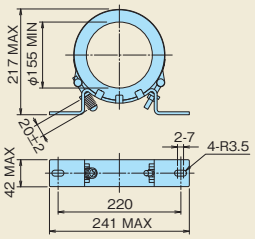
ACL-40B



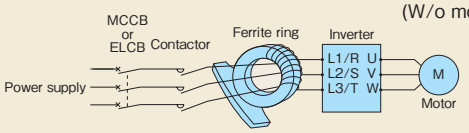
ACL-74B



F200160
(W/o mounting legs)



F200160PB
(Mounting legs provided)



■ Recommended wire size

Ferrite ring types for reducing radio noise	Q'ty	No. of turns	Recommended wire size [mm2] *)
ACL-40B	1	4	2.0, 3.5, 5.5
	2	2	8, 14
ACL-74B	1	4	8, 14
	2	2	22, 38, 60, 5.5×2, 8×2, 14×2, 22×2
	4	1	100, 150, 200, 250, 325, 38×2, 60×2, 100×2, 150×2
F200160	4	1	200×2, 250×2, 325×2, 325×3
F200160PB	4	1	200×2, 250×2, 325×2, 325×3

NOTE: *) Use a 600V HIV insulation cable (Allowable temp. 75°C).

Output circuit filter (OFL-□□□4A)[400V series]

■Filter dimensions (22kW or less)

Fig.A

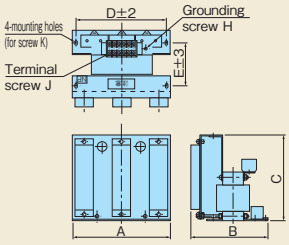
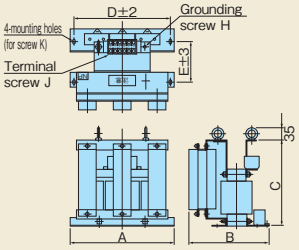


Fig.B



■Filter dimensions (30kW or more):reactor

Fig.C

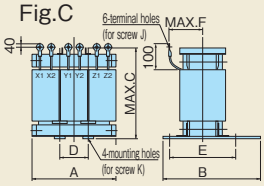


Fig.D

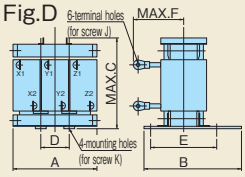
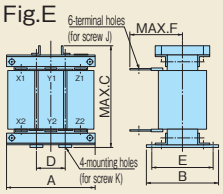
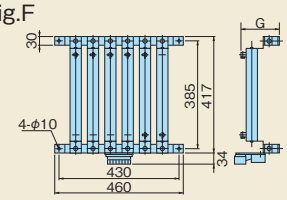


Fig.E



■Filter dimensions (30kW or more):resistor/capacitor

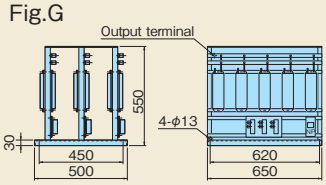
Fig.F



The reactor, capacitor and resistor for filter OFL-30-4A or larger have to be installed separately.

Those items are not included in the mass indicated in the table below. They are shipped as a set by ordering the filter.

Fig.G



Voltage	Nominal applied motor [kW]	Inverter type			Filter type	Fig.	Dimensions [mm]										Approx. weight [kg]
		HD	MD	LD			A	B	C	D	E	F	G	Grounding screw H	Terminal screw J	Mounting screw K	
400V series	3.7	FRN3.7VG1S-4J	—	—	OFL-3.7-4A	A	220	225	220	200	115	—	—	M4	M4	M5	14
	5.5	FRN5.5VG1S-4J	—	—	OFL-7.5-4A		290	290	230	260	160	—	—	M5	M5	M6	22
	7.5	FRN7.5VG1S-4J	—	—													
	11	FRN11VG1S-4J	—	—	OFL-15-4A	B	330	275	310	300	145	—	—	M6	M6	M8	35
	15	FRN15VG1S-4J	—	—													
	18.5	FRN18.5VG1S-4J	—	—	OFL-22-4A		330	300	330	300	170	—	—	M6	M6	M8	45
	22	FRN22VG1S-4J		—													
	30	FRN30VG1S-4J	—	—	OFL-30-4A	C/F	210	175	210	70	140	90	160	—	M5	M6	12
	37	FRN37VG1S-4J	—	FRN30VG1S-4J	OFL-37-4A		220	190	220	75	150	95	160	—	M5	M6	15
	45	FRN45VG1S-4J	—	FRN37VG1S-4J	OFL-45-4A	D/F	220	195	265	70	155	140	160	—	M6	M8	17
	55	FRN55VG1S-4J	—	FRN45VG1S-4J	OFL-55-4A		260	200	275	85	160	150	160	—	M6	M8	22
	75	FRN75VG1S-4J	—	FRN55VG1S-4J	OFL-75-4A		260	210	290	85	170	150	233	—	M8	M10	25
	90	FRN90VG1S-4J	—	FRN75VG1S-4J	OFL-90-4A		260	210	290	85	170	155	233	—	M8	M10	28
	110	FRN110VG1S-4J	FRN90VG1S-4J	FRN90VG1S-4J	OFL-110-4A		300	230	330	100	190	170	233	—	M8	M10	38
	132	FRN132VG1S-4J	FRN110VG1S-4J	FRN110VG1S-4J	OFL-132-4A		300	240	340	100	200	170	233	—	M10	M10	42
	160	FRN160VG1S-4J	FRN132VG1S-4J	FRN132VG1S-4J	OFL-160-4A		300	240	340	100	200	180	233	—	M10	M10	48
	200	FRN200VG1S-4J	FRN160VG1S-4J	FRN160VG1S-4J	OFL-200-4A		320	270	350	105	220	190	333	—	M10	M12	60
	220	FRN220VG1S-4J	FRN200VG1S-4J	FRN200VG1S-4J	OFL-220-4A		340	300	390	115	250	190	333	—	M10	M12	70
	250	—	FRN220VG1S-4J	—	OFL-280-4A		350	300	430	115	250	200	333	—	M10	M12	78
	280	FRN280VG1S-4J	—	FRN220VG1S-4J													
	315	FRN315VG1S-4J	FRN280VG1S-4J	—	OFL-315-4A	E/G	440	275	450	150	230	170	—	—	M12	M12	90
	355	FRN355VG1S-4J	FRN315VG1S-4J	FRN280VG1S-4J	OFL-355-4A		440	290	480	150	245	175	—	—	M12	M12	100
	400	FRN400VG1S-4J	FRN355VG1S-4J	FRN315VG1S-4J	OFL-400-4A		440	295	510	150	240	175	—	—	M12	M12	110
	450	—	FRN400VG1S-4J	FRN355VG1S-4J	OFL-450-4A		440	325	470	150	270	195	—	—	M12	M12	125
	500	FRN500VG1S-4J	—	FRN400VG1S-4J	OFL-500-4A		440	335	500	150	280	210	—	—	M12	M12	145
	630	FRN630VG1S-4J	—	FRN500VG1S-4J	OFL-630-4A		480	355	560	150	280	245	—	—	M12	M12	170
	710	—	—	FRN630VG1S-4J	—		—	—	—	—	—	—	—	—	—	—	—

* Carrier frequency is not limited with OFL-*** -4A.

Power regenerative PWM converter (RHC series)

Features

■ Possible to reduce power supply facility capacity

Its power-factor control realizes the same phase current as the power-supply phase-voltage. The equipment, thus, can be operated with the power-factor of almost "1."

This makes it possible to reduce the power transformer capacity and downsize the other devices, compared with those required without the converter.

■ Upgraded braking performance

Regenerated energy occurring at highly frequent accelerating and decelerating operation and elevating machine operation is entirely returned to power supply side.

Thus, energy saving during regenerative operation is possible.

As the current waveform is sinusoidal during regenerative operation, no troubles are caused to the power supply system.

Rated continuous regeneration :	100%
Rated regeneration for 1 min	150% (CT use)
	120% (VT use)

■ Enhanced maintenance/protective functions

・Failure can be easily analyzed with the trace back function (option).

①The past 10 alarms can be displayed with the 7-segment LEDs.

This helps you analyze the alarm causes and take countermeasures.

②When momentary power failure occurs, the converter shuts out the gate to enable continuous operation after recovery.

③The converter can issue warning signals like overload, heat sink overheating, or the end of service life prior to converter tripping.

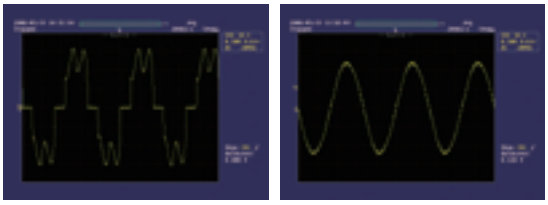
■ Enhanced network support

・The converter can be connected to MICREX-SX, F series and CC-Link master devices (using option).

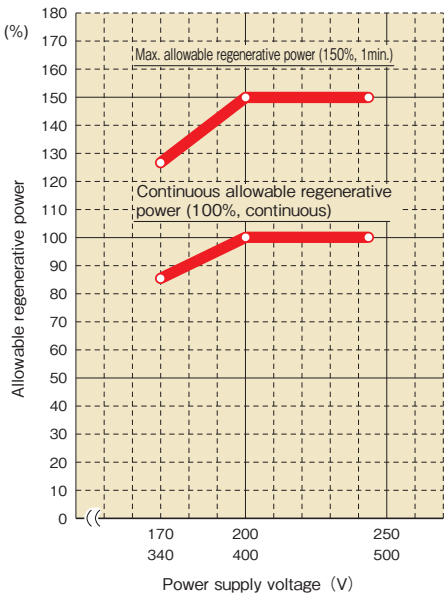
The RS-485 interface is provided as standard.

Comparison of input current waveform

<w/ PWM converter> <w/o PWM converter>



Allowable characteristics of the RHC unit



Standard specifications and Common specifications

Standard specifictions

■200V series

Item			Standard specification										
Type RHC□□□-2C			200V series										
			7.5	11	15	18.5	22	30	37	45	55	75	90
CT use	Applicable inverter capacity[kW]		7.5	11	15	18.5	22	30	37	45	55	75	90
	Output	Continuous capacity[kW]	8.8	13	18	22	26	36	44	53	65	88	103
		Overload rating	150% of rated current for 1min.										
		Voltage 200V	DC320 to 355V (Variable with input power supply voltage) (*3)										
	Required power supply capacity[kVA]		9.5	14	19	24	29	38	47	57	70	93	111
	Carrier frequency		Standard 15kHz									Standard 10kHz	
VT use	Applicable inverter capacity[kW]		11	15	18.5	22	30	37	45	55	75	90	110
	Output	Continuous capacity[kW]	13	18	22	26	36	44	53	65	88	103	126
		Overload capability	120% of rated current for 1min.										
		Voltage 200V	DC320 to 355V (Variable with input power supply voltage) (*3)										
	Required power supply capacity[kVA]		14	19	24	29	38	47	57	70	93	111	136
	Carrier frequency		Standard 10kHz									Standard 6kHz	
Power supply voltage	Number of phase/Voltage/Frequency		3-phase 3-wire, 200 to 220V 50Hz,220 to 230V 50Hz(*1),200 to 230V 60Hz										
	Voltage/Frequency variation		Voltage+10 to -15%, Frequency ±5%, Voltage unbalance: 2% or less (*4)										

■ 400V series

Item			Standard specification																				
Type RHC□□□-4C			400V series																				
			7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630
CT use	Applicable inverter capacity[kW]		7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500	630
	Output	Continuous capacity[kW]	8.8	13	18	22	26	36	44	53	65	88	103	126	150	182	227	247	314	353	400	448	560	705
		Overload rating	150% of rated current for 1min.																				
		Voltage 400V	DC640 to 710V (Variable with input power supply voltage) (*3)																				
	Required power supply capacity(kVA)		9.5	14	19	24	29	38	47	57	70	93	111	136	161	196	244	267	341	383	433	488	610	762
	Carrier frequency		Standard 15kHz									Standard 10kHz											Standard 6kHz
VT use	Applicable inverter capacity[kW]		11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	280	315	355	400	500		
	Output	Continuous capacity[kW]	13	18	22	26	36	44	53	65	88	103	126	150	182	227	247	314	353	400	448	560		
		Overload capability	120% of rated current for 1min.																				
		Voltage 400V	DC640 to 710V (Variable with input power supply voltage) (*3)																				
	Required power supply capacity(kVA)		14	19	24	29	38	47	57	70	93	111	136	161	196	244	267	341	383	433	488	610		
	Carrier frequency		Standard 10kHz									Standard 6kHz											
Power supply voltage	Number of phase/Voltage/Frequency		3-phase 3-wire, 380 to 440V 50Hz,380 to 460V 60Hz(*2)																				
	Voltage/Frequency variation		Voltage+15 to -10%, Frequency ±5%, Voltage unbalance: 2% or less(*4)																				

(*1) 220 to 230V/50Hz model available on request.
(*2) The tap in the converter must be switched when the power supply voltage is 380 to 398V/50Hz or 380 to 430V/60Hz. The capacity must be reduced when the power supply voltage is less than 400V.
(*3) The output voltage is 320/640 VDC, 343/686 VDC, 355/710 VDC when the power supply voltage is 200/400V, 220/440V and 230/460V, respectively.
(*4) Voltage unbalance [%] = (Max. voltage [V] - Min. voltage [V])/Three-phase average voltage [V] × 67

Common specifications

Item		specification
Control	Control method	AVR constant control with DC ACR minor
	Running	Rectification starts with power ON after connected.Pressurization starts with the running signal (RUN-CM short-circuit or running command from communications). Then, preparation for operation is completed.
	Running status signal	Running, driving, regenerating, operation ready, alarm relay output (for any fault), etc.
	CT/VT switching	Selecting from CT: Overload rating 150% (1min.) and VT: Overload rating 120% (1min.)
	Carrier frequency	Fixed to high carrier frequency
	Input power factor	Above 0.99
	Input high-frequency current	According to the guideline for suppressing harmonics issued by the Ministry of Economy, Trade and Industry, the converter factor (Ki) can be set to 0.
	Restart mode after momentary power failure	Shields the gate when the voltage level reaches undervoltage level if momentary power failure occurs, and the converter can automatically restart after the power recovers.
	Power limit control	Controls the power not to exceed the preset limit value.
Display	Alarm display (protective functions)	AC fuse blown, AC overvoltage, AC undervoltage, AC overcurrent, AC input current error, Input phase loss, Synchronous power supply frequency error, DC fuse blown, DC overvoltage, DC undervoltage, Charge circuit error, Heat sink overheat, External alarm, Converter overheat, Overload, Memory error, Keypad communication error, CPU error, Network device error, Operation procedure error, A/D converter error, Optical network error, IPM error
	Alarm history	Records and displays the last 10 alarms. The detailed information of the trip cause for the previous alarm is stored and displayed.
	Monitor	Displays input power, input effective current, input effective voltage, DC intermediate current and power supply frequency.
	Load factor	The load rate can be measured by using the keypad.
	Display language	Function codes can be set or referred to in Japanese, English and Chinese (3 languages).
	Charge lamp	Lights when the main circuit condenser is charged.

Options

Terminal Functions

Terminal Functions

Division	Symbol	Terminal name	Functions
Main circuit	L1/R, L2/S, L3/T	Power input	Connects with a three-phase power supply via the dedicated reactor.
	P(+), N(–)	Converter output	Connects with the inverter power supply input terminal P (+), N (-).
	E(G)	Grounding	Ground terminal for inverter chassis (housing).
	R0, T0	Auxiliary control power supply	Connects with the same power circuit as that for the control power backup terminal and the main power circuit.
Voltage detection	R1, S1, T1	Synchronous power supply input for voltage detection	Voltage detection terminals for controlling the inside of the converter. These are connected with the power supply side of the dedicated reactor and filter.
	R2, T2	Control monitor input	Terminals that connect with the circuit for detecting disconnection caused by blown AC fuse.
Input signal	RUN	RUN command	The converter starts running when this command is ON between RUN and CM, and stops when OFF.
	RST	Alarm reset command	In case of alarm stop, eliminate the cause and turn on this command between RST and CM. The protective function is disabled and the alarm state is released.
	X1	General-purpose transistor input	0: External fault [THR], 1: Current limit cancel [LMT-CCL], 2: 73 answerback [73ANS], 3: Current limit switching [1-LIM], 4: Optional DI [OPY-DI]
	CM	Digital input common	Common terminal for digital input signals.
	PLC	PLC signal power supply	Connects with the PLC output signal power supply. (Rated voltage: 24V (22 to 27V) DC)
Output signal	30A, 30B, 30C	Alarm relay output (for any fault)	Outputs a signal when a protective function is activated to stop the converter. (Contact at 1C, Circuit between 30A and 30C comes ON when an alarm occurs) (Contact capacity: 250V AC, max 50mA.)
	Y1, Y2, Y3, Y11 to Y18	General-purpose transistor output	0: Inverter running [RUN] 1: Operation ready output [RDY] 2: Power supply current limiting [IL] 3: Lifetime alarm [LIFE] 4: Cooling fin overload [PRE-OH] 5: Overload alarm [PRE-OL] 6: Driving [DRV] 7: Regenerating [REG] 8: Current limit alarm [CUR] 9: Under restart [U-RES] 10: Power supply frequency synchronizing [SY-HZ] 11: Alarm indication [AL1] 12: Alarm indication 2 [AL2] 13: Alarm indication 4 [AL4] 14: Optional DO [OPT-DO] * With OPC-VG-AO option, 8-point expanded functions become available (DI function is not available.)
	CME	Digital output common	
	Y5A, Y5C	Relay output	
	A01, A04, A05	General-purpose analog output	0: Input power [PWR] 1: Input current rms [I-AC] 2: Input voltage rms [V-AC] 3: DC link circuit voltage [V-DC] 4: Power supply frequency [FREQ] 5: +10V output test [P10] -10V output test [N10] * With OPC-VG-AO option, 2-point expanded functions become available (Ai function is not usable.)
	M	Analog output common	Common terminal for analog input signals.
	73A, 73C	Charging resistance input relay output	Control output for the input relay of the external charging resistance (73)

Communications Specifications

Item			Specifications
Communi-cation specification	General specifications for communication		Enables to show running information and running status, and to monitor the function code (polling), and to control (selecting) RUN, RST, and X1. * No function code can be written.
	RS-485 (standard)		Communicates with the PC or PLC (Fuji protocol and RTU are supported.)
	T-Link (optional)		OPC-VG7-TL option allows T-Link communication with the T-Link module in the MICREX-F or MICREX-SX.
	SX bus (optional)		OPC-VG7-SX option allows connection between SX bus and MICREX-SX.
	CC-Link (optional)		OPC-VG7-SX option allows connection with the CC-Link master device.
	Trace back (optional)	Hardware	OPC-RHC-TR option allows trace-back of the converter operation status data. The software (WPS-LD-TR) is required.
		Software	WPS-RHC-TR software allows collecting the trace back data on the PC.
	Optical communications (optional)		OPC-VGS-SI option allows sharing the load of the concurrent multitasking system. Therefore, the capacity of up to 2400kW can be supported.

Function Settings

Function code	Name
F00	Data protection
F01	High-frequency filter selection
F02	Restart mode after momentary power failure (operation selection)
F03	Current rating switching
F04	LED monitor (Display selection)
F05	LCD monitor (Display selection)
F06	LCD monitor (Language selection)
F07	LCD monitor (Contrast adjusting)
F08	Carrier frequency
E01	X1 function selection
E02 to 13	Y1, Y2, Y3, Y5, Y11 to 18 function selection
E14	I/O function normally open/normally closed
E15	RHC overload early warning level
E16	Cooling fan ON-OFF control
E17	Output while limiting the current (hysteresis width)
E18 to 20	A01, A04, A05 function selection
E21 to 23	A01, A04, A05 gain setting
E24 to 26	A01, A04, A05 bias setting
E27	A01 to 5 filter setting
S01	Operation method
S02,03	Power supply current limit (drive/ control)
H01	Station address
H02	Communication error processing
H03	Timer operation time
H04	Baud rate
H05	Data length selection
H06	Parity check
H07	Stop bit check
H08	No-response error detection time
H09	Response interval
H10	Protocol selection
H11	TL transmission format
H12	Parallel system
H13	Number of slave stations in parallel system
H14	Alarm data deletion
H15,16	Power supply current limit (drive 1/2)
H17,18	Power supply current limit (control 1/2)
H19,20	Current limit early warning (level/ timer)
M09	Power supply frequency
M10	Input power
M11	Effective input current
M12	Effective input voltage
M13	Run command
M14	Running status
M15	Output terminals Y1 to Y18

Protective Functions

Item	LED monitor	Function	Remarks
AC fuse blown	ACF	When the AC fuse is blown (only R and T phases), the converter stops running.	
AC overvoltage	AOV	The converter stops running on detection of AC overvoltage.	
AC undervoltage	ALV	The converter stops running on detection of AC undervoltage.	
AC overcurrent	AOC	The converter stops running if the input current peak value exceeds the overcurrent level.	
AC input current error	ACE	The converter stops running on detection of excessive deviation between AC input and ACR.	
Input phase loss	LPV	The converter stops running if the input phase loss occurs in the power supply.	
Synchronous power supply frequency error	FrE	The power supply frequency is checked after "73" is input. If a frequency error is detected, the converter stops running. Error during converter running (such as momentary power failure) triggers no alarm.	
DC fuse blown	dCF	The converter stops running if the AC fuse is blown (P side).	Above 18.5kW
DC overvoltage	dOV	The converter stops running on detection of DC overvoltage. If the power failure takes long and the control power goes out, the converter is automatically reset.	200V series: Above 400V±3V 400V series: Above 800V±5V
DC undervoltage	dLV	The converter stops running on detection of DC undervoltage. If the power failure takes long and the control power goes out, the converter is automatically reset.	200V series: Runs at 185V and restarts at 208V 400V series: Runs at 371V and restarts at 417V
Charge circuit error	PbF	When the charge circuit error is detected while the answerback signal usage at input of 73 is specified, the converter stops running.	Condition: X1 "73 Answerback" is selected.
Cooling fin overheat	OH1	The converter stops running if the cooling fin overheat is detected.	
External alarm	OH2	The converter stops running if an external signal (THR) is input.	Condition: X1 "External alarm" is selected.
Converter internal overheat	OH3	When overheat is detected in the inverter, the converter stops running.	
Converter overload	OLU	When the output current exceeds the overload characteristic of the inverse time characteristic, the converter stops running.	Start point: 105%, 150% 1 minute
Memory error	Er1	When a fault such as "write error" occurs in the memory (checksum values in EEPROM and RAM do not match), the converter stops running.	
Keypad communication error	Er2	Activated if an error is detected during initial communication. The converter continues operating.	
CPU error	Er3	Activated if an error is detected in the CPU.	
Network device error	Er4	The converter stops running if a fatal error is detected in the master network device (including unconnected power supply).	Applicable to T-Link, SX and CC-Link
Operation procedure error	Er6	When an error is detected in operation procedure, the converter stops running.	
A/D converter error	Er8	When an error is detected in the A/D converter circuit, the converter stops running.	
Optical network error	Erb	The converter stops running if the optical cable is disconnected or a fatal error is detected in an optical device (optional)	
IPM error	IPE	Activated if IPM self-shutoff function is triggered by excessive current or overheat.	Less than 15kW

Structure and environment

Item		Structure, environment and standard	Remarks
Structure specifications	Structure	Installed in the panel and cooled by external device	
	Protective structure	IP00	
	Cooling system	Forced air cooling	
	Installation method	Vertical installation	
	Color	Munsell 5Y3/0.5 half-burnished	
	Maintainability	Structure designed for easy parts change	
Environment	Location	Indoor, location free from corrosive gas, flammable gas, dust and direct light	
	Ambient temperature	-10 to 50°C	
	Humidity	5 to 95%RH Without condensing	
	Altitude	Less than 3000m (output reduction may occur if the altitude is in the range between 1001 and 3000m)	
	Vibration	2 to 9Hz: Amplitude=3mm, 9 to 20Hz: 9.8m/s², 20 to 55Hz: 2m/s² (9 to 55Hz: 2m/s² is used if the power is higher than 90kW.)	
	Storage temperature	-20 to 55°C	
	Storage humidity	5 to 95%RH	

Equipment Configuration List

CT use

Voltage	Nominal applied motor[kw]	PWM converter type	Charging circuit contactor		Contactor for powersource		Charging circuit box(*1)						Reactor for pressurizing		Resistance for filter		Reactor for filter		Capacitor for filter		Filtering circuit contactor	
									Charging resistance		Fuse											
			(73)	Q'ty	(52)	Q'ty	(CU)	Q'ty	(R0)	Q'ty	(F)	Q'ty	(Lr)	Q'ty	(Rf)	Q'ty	(Lf)	Q'ty	(Cf)	Q'ty	(6F)	Q'ty
200V series	7.5	RHC7.5-2C	SC-5-1	1			CU7.5-2C	1	(80W 7.5Ω)	(3)	(CR2LS-50/UL)	(2)	LR2-7.5C	1	GRZG80 0.42Ω	3	LFC2-7.5C	1	CF2-7.5C	1		
	11	RHC11-2C	SC-N1	1			CU11-2C	1	(HF5C5504)		(CR2LS-75/UL)	(2)	LR2-15C	1	GRZG150 0.2Ω	3	LFC2-15C	1	CF2-15C	1		
	15	RHC15-2C	SC-N2	1			CU15-2C	1			(CR2LS-100/UL)	(2)										
	18.5	RHC18.5-2C	SC-N3	1			CU18.5-2C	1	(GRZG120 2Ω)	(3)			LR2-22C	1	GRZG200 0.13Ω	3	LFC2-22C	1	CF2-22C	1		
	22	RHC22-2C					CU22-2C	1			(CR2L-150/UL)	(2)										
	30	RHC30-2C	SC-N4	1			CU30-2C	1			(CR2L-200/UL)	(2)	LR2-37C	1	GRZG400 0.1Ω	3	LFC2-37C	1	CF2-37C	1		
	37	RHC37-2C	SC-N5	1			CU45-2C	1			(CR2L-260/UL)	(2)										
	45	RHC45-2C	SC-N7	1									LR2-55C	1			LFC2-55C	1	CF2-55C	1		
	55	RHC55-2C	SC-N8	1			CU55-2C	1			(CR2L-400/UL)	(2)										
	75	RHC75-2C	SC-N11	1			CU75-2C	1					LR2-75C	1			LFC2-75C	1	CF2-75C	1		
	90	RHC90-2C					CU90-2C	1	(GRZG400 1Ω)	(3)	(A50P600-4)	(2)	LR2-110C	1	GRZG400 0.12Ω [2並列]	6	LFC2-110C	1	CF2-110C	1		
400V series	7.5	RHC7.5-4C	SC-05	1			CU7.5-4C	1	(TK50B 30ΩJ)	(3)	(CR6L-30/UL)	(2)	LR4-7.5C	1	GRZG80 1.74Ω	3	LFC4-7.5C	1	CF4-7.5C	1		
	11	RHC11-4C	SC-4-0	1			CU15-4C	1	(HF5B0416)		(CR6L-50/UL)	(2)	LR4-15C	1	GRZG150 0.79Ω	3	LFC4-15C	1	CF4-15C	1		
	15	RHC15-4C	SC-5-1	1																		
	18.5	RHC18.5-4C	SC-N1	1			CU18.5-4C	1	(80W 7.5Ω)	(3)			LR4-22C	1	GRZG200 0.53Ω	3	LFC4-22C	1	CF4-22C	1		
	22	RHC22-4C					CU22-4C	1	(HF5C5504)		(CR6L-75/UL)	(2)										
	30	RHC30-4C	SC-N2	1			CU30-4C	1			(CR6L-100/UL)	(2)	LR4-37C	1	GRZG400 0.38Ω	3	LFC4-37C	1	CF4-37C	1		
	37	RHC37-4C	SC-N2S	1			CU45-4C	1			(CR6L-150/UL)	(2)										
	45	RHC45-4C	SC-N3	1									LR4-55C	1	GRZG400 0.26Ω	3	LFC4-55C	1	CF4-55C	1		
	55	RHC55-4C	SC-N4	1			CU55-4C	1			(CR6L-200/UL)	(2)										
	75	RHC75-4C	SC-N5	1			CU75-4C	1					LR4-75C	1	GRZG400 0.38Ω	3	LFC4-75C	1	CF4-75C	1		
	90	RHC90-4C	SC-N7	1			CU90-4C	1			(CR6L-300/UL)	(2)	LR4-110C	1	GRZG400 0.53Ω [2並列]	6	LFC4-110C	1	CF4-110C	1		
	110	RHC110-4C	SC-N8	1			CU110-4C	1	(GRZG120 2Ω)	(3)												
	132	RHC132-4C					CU132-4C	1			(A50P400-4)	(2)	LR4-160C	1	RF4-160C	1	LFC4-160C	1	CF4-160C	1		
	160	RHC160-4C	SC-N11	1			CU160-4C	1			(A50P600-4)	(2)										
	200	RHC200-4C	SC-N12	1			CU200-4C	1	(GRZG400 1Ω)	(3)			LR4-220C	1	RF4-220C	1	LFC4-220C	1	CF4-220C	1		
	220	RHC220-4C					CU220-4C	1			(A70QS800-4)	(2)										
	280	RHC280-4C	SC-N3	1	SC-N14	1			GRZG400 1Ω [2並列]	6	A70QS800-4	2	LR4-280C	1	RF4-280C	1	LFC4-280C	1	CF4-280C	1	SC-N4	1
	315	RHC315-4C									A70P1600-4TA	2	LR4-315C	1	RF4-315C	1	LFC4-315C	1	CF4-315C	1		
	355	RHC355-4C											LR4-355C	1	RF4-355C	1	LFC4-355C	1	CF4-355C	1		
	400	RHC400-4C			SC-N16	1							LR4-400C	1	RF4-400C	1	LFC4-400C	1	CF4-400C	1		
	500	RHC500-4C			SC-N11	3							LR4-500C	1	RF4-500C	1	LFC4-500C	1	CF4-500C	1(*2)		
	630	RHC630-4C			SC-N12	3					A70P2000-4	2	LR4-630C	1	RF4-630C	1	LFC4-630C	1	CF4-630C	1(*2)	SC-N7	1

VT use

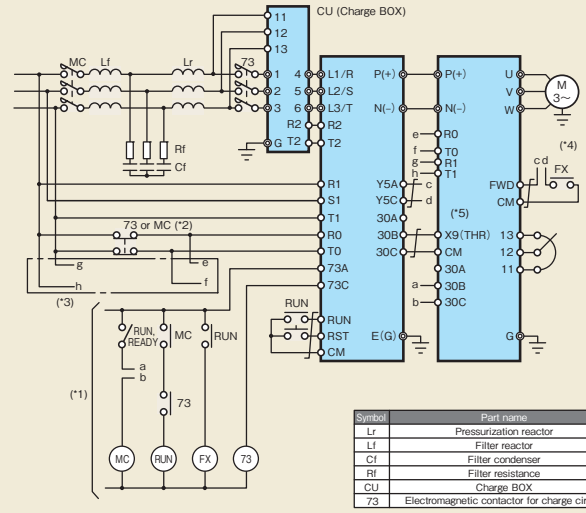
Voltage	Nominal applied motor[kw]	PWM converter type	Charging circuit contactor		Contactor for powersource		Charging circuit box(*1)						Reactor for pressurizing		Resistance for filter		Reactor for filter		Capacitor for filter		Filtering circuit contactor	
									Charging resistance		Fuse											
			(73)	Q'ty	(52)	Q'ty	(CU)	Q'ty	(R0)	Q'ty	(F)	Q'ty	(Lr)	Q'ty	(Rf)	Q'ty	(Lf)	Q'ty	(Cf)	Q'ty	(6F)	Q'ty
200V series	11	RHC7.5-2C	SC-N1	1			CU7.5-2C	1	(80W 7.5Ω)	(3)	(CR2LS-50/UL)	(2)	LR2-15C	1	GRZG150 0.2Ω	3	LFC2-15C	1	CF2-15C	1		
	15	RHC11-2C	SC-N2	1			CU11-2C	1	(HF5C5504)		(CR2LS-75/UL)	(2)										
	18.5	RHC15-2C	SC-N3	1			CU15-2C	1			(CR2LS-100/UL)	(2)	LR2-22C	1	GRZG200 0.13Ω	3	LFC2-22C	1	CF2-22C	1		
	22	RHC18.5-2C					CU18.5-2C	1	(GRZG120 2Ω)	(3)												
	30	RHC22-2C	SC-N4	1			CU22-2C	1			(CR2L-150/UL)	(2)	LR2-37C	1	GRZG400 0.1Ω	3	LFC2-37C	1	CF2-37C	1		
	37	RHC30-2C	SC-N5	1			CU30-2C	1			(CR2L-200/UL)	(2)										
	45	RHC37-2C	SC-N7	1			CU45-2C	1			(CR2L-260/UL)	(2)	LR2-55C	1			LFC2-55C	1	CF2-55C	1		
	55	RHC45-2C	SC-N8	1																		
	75	RHC55-2C	SC-N11	1			CU55-2C	1			(CR2L-400/UL)	(2)	LR2-75C	1			LFC2-75C	1	CF2-75C	1		
	90	RHC75-2C					CU75-2C	1					LR2-110C	1	GRZG400 0.12Ω [2並列]	6	LFC2-110C	1	CF2-110C	1		
	110	RHC90-2C	SC-N12	1			CU90-2C	1	(GRZG400 1Ω)	(3)	(A50P600-4)	(2)										
400V series	11	RHC7.5-4C	SC-4-0	1			CU7.5-4C	1	(TK50B 30ΩJ)	(3)	(CR6L-30/UL)	(2)	LR4-15C	1	GRZG150 0.79Ω	3	LFC4-15C	1	CF4-15C	1		
	15	RHC11-4C	SC-5-1	1			CU15-4C	1	(HF5B0416)		(CR6L-50/UL)	(2)										
	18.5	RHC15-4C	SC-N1	1									LR4-22C	1	GRZG200 0.53Ω	3	LFC4-22C	1	CF4-22C	1		
	22	RHC18.5-4C					CU18.5-4C	1	(80W 7.5Ω)	(3)												
	30	RHC22-4C	SC-N2	1			CU22-4C	1	(HF5C5504)		(CR6L-75/UL)	(2)	LR4-37C	1	GRZG400 0.38Ω	3	LFC4-37C	1	CF4-37C	1		
	37	RHC30-4C	SC-N2S	1			CU30-4C	1			(CR6L-100/UL)	(2)										
	45	RHC37-4C	SC-N3	1			CU45-4C	1			(CR6L-150/UL)	(2)	LR4-55C	1	GRZG400 0.26Ω	3	LFC4-55C	1	CF4-55C	1		
	55	RHC45-4C	SC-N4	1																		
	75	RHC55-4C	SC-N5	1			CU55-4C	1			(CR6L-200/UL)	(2)	LR4-75C	1	GRZG400 0.38Ω	3	LFC4-75C	1	CF4-75C	1		
	90	RHC75-4C	SC-N7	1			CU75-4C	1					LR4-110C	1	GRZG400 0.53Ω [2並列]	6	LFC4-110C	1	CF4-110C	1		
	110	RHC90-4C	SC-N8	1			CU90-4C	1			(CR6L-300/UL)	(2)										
	132	RHC110-4C					CU110-4C	1	(GRZG120 2Ω)	(3)			LR4-160C	1	RF4-160C	1	LFC4-160C	1	CF4-160C	1		
	160	RHC132-4C	SC-N11	1			CU132-4C	1			(A50P400-4)	(2)										
	200	RHC160-4C	SC-N12	1			CU160-4C	1			(A50P600-4)	(2)	LR4-220C	1	RF4-220C	1	LFC4-220C	1	CF4-220C	1		
	220	RHC200-4C					CU200-4C	1	(GRZG400 1Ω)	(3)												
	280	RHC220-4C	SC-N14	1			CU220-4C	1			(A70QS800-4)	(2)	LR4-280C	1	RF4-280C	1	LFC4-280C	1	CF4-280C	1		
	315	RHC280-4C	SC-N3	1	SC-N14	1			GRZG400 1Ω [2並列]	6	A70QS800-4	2	LR4-315C	1	RF4-315C	1	LFC4-315C	1	CF4-315C	1	SC-N4	1
	355	RHC315-4C									A70P1600-4TA	2	LR4-355C	1	RF4-355C	1	LFC4-355C	1	CF4-355C	1		
	400	RHC355-4C			SC-N16	1							LR4-400C	1	RF4-400C	1	LFC4-400C	1	CF4-400C	1		
	500	RHC400-4C			SC-N11	3							LR4-500C	1	RF4-500C	1	LFC4-500C	1	CF4-500C	1(*2)		

(*1) The charging resistance (R0) and fuse (F) have been built in the charging circuit box (CU). When the charging circuit box (CU) is not necessary, order the charging resistance (R0) and fuse (F) separately.
(*2) The filter capacitor consists of two capacitors. A pair of capacitors is shipped by ordering "1" pc.

Options

Basic Wiring Diagram

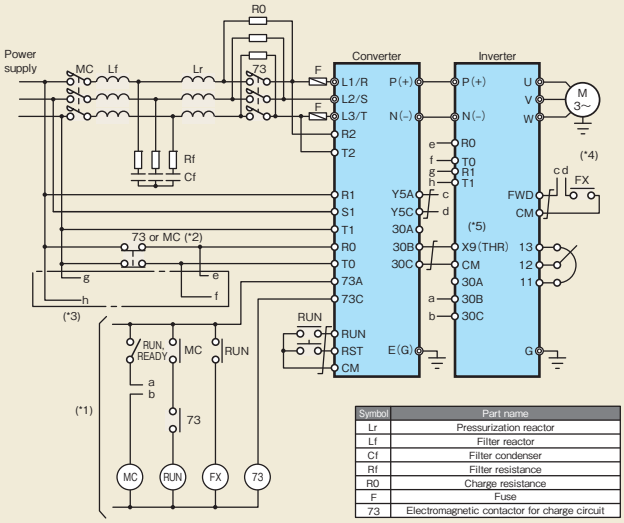
■RHC7.5-2C to RHC90-2C (Applicable inverter: 3-phase 200V, 7.5 to 90kW)
■RHC7.5-4C to RHC220-4C (Applicable inverter: 3-phase 400V, 7.5 to 220kW)
*When adapting a charge BOX



Symbol	Part name
Lr	Pressurization reactor
Lf	Filter reactor
Cf	Filter condenser
Rf	Filter resistance
CU	Charge BOX
73	Electromagnetic contactor for charge circuit

(*1) If the main power supply is 400V series, connect the step-down transformer to limit the voltage of the sequence circuit lower than 220V.
(*2) The auxiliary power supply input terminal for the PWM converter (R0, T0) must be connected to the main power supply via the contact "b" of the electromagnetic contactor for charge circuit (73 or MC).
If 73 is SC-05, SC-4-0, or SC-5-1, use the auxiliary contact unit for the contact "b" of MC or 73.
(*3) Make sure to connect the auxiliary power supply input terminal of the inverter (R0,T0) to the main power supply via the contact "b" of the electromagnetic contactor for charge circuit (73 or MC). For the capacity of FRN37VG1S-2J and FRN75VG1S-4J or more, connect it to the main power supply without passing the inverter fan power auxiliary input terminal (R1,T1) and the contact "b" of 73 or MC.
(*4) Use the sequence that a running signal is input in the inverter after the PWM converter becomes ready.
(*5) One of terminals (X1 to X9) on the inverter unit must be set to external alarm (THR).

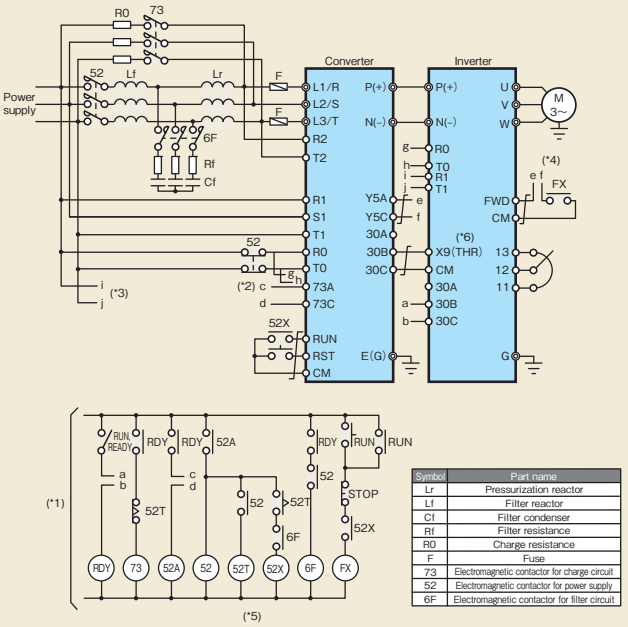
■RHC7.5-2C to RHC90-2C (Applicable inverter: 3-phase 200V, 7.5 to 90kW)
■RHC7.5-4C to RHC220-4C (Applicable inverter: 3-phase 400V, 7.5 to 220kW)



Symbol	Part name
Lr	Pressurization reactor
Lf	Filter reactor
Cf	Filter condenser
Rf	Filter resistance
R0	Charge resistance
F	Fuse
73	Electromagnetic contactor for charge circuit

(*1) If the main power supply is 400V series, connect the step-down transformer to limit the voltage of the sequence circuit lower tan 220V.
(*2) The auxiliary power supply input terminal for the PWM converter (R0, T0) must be connected to the main power supply via the contact "b" of the electromagnetic contactor for charge circuit (73 or MC).
If 73 is SC-05, SC-4.0, or SC-5-1, use the auxiliary contact unit for the contact "b" of MC or 73.
(*3) Make sure to connect the auxiliary power supply input terminal of the inverter (R0,T0) to the main power supply via the contact "b" of the electromagnetic contactor for charge circuit (73 or MC). For the capacity of FRN37VG1S-2J and FRN75VG1S-4J or more, connect it to the main power supply without passing the inverter fan power auxiliary input terminal (R1,T1) and the contact "b" of 73 or MC.
(*4) Use the sequence that a running signal is input in the inverter after the PWM converter becomes ready.
(*5) One of terminals (X1 to X9) on the inverter unit must be set to external alarm (THR).

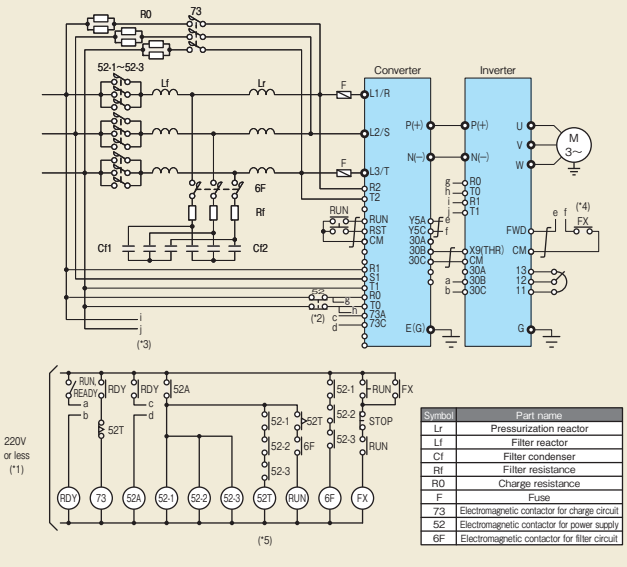
■RHC280-4C to RHC400-4C (Applicable inverter: 3-phase 400V, 280 to 400kW)



Symbol	Part name
Lr	Pressurization reactor
Lf	Filter reactor
Cf	Filter condenser
Rf	Filter resistance
R0	Charge resistance
F	Fuse
73	Electromagnetic contactor for charge circuit
52	Electromagnetic contactor for power supply
6F	Electromagnetic contactor for filter circuit

(*1) Connect the step-down transformer to limit the voltage of the sequence circuit lower than 200V.
(*2) The auxiliary power supply input terminal for the PWM converter (R0, T0) must be connected to the main power supply via the contact "b" of the electromagnetic contactor for charge circuit (52).
(*3) Since the AC fan power supply receives power from R0 and T0 terminals, the power supply must be connected without passing the contact "b" of 52.
(*4) Use the sequence that a running signal is input in the inverter after the PWM converter becomes ready.
(*5) The 52T timer must be set to 1 sec.
(*6) One of terminals (X1 to X9) on the inverter must be set to external alarm (THR).

■RHC400-4C with VT specification (Applicable inverter: 3-phase 400V, 400kW(LD))
■RHC500-4C, RHC630-4C (Applicable inverter: 3-phase 400V, 500, 630kW)



Symbol	Part name
Lr	Pressurization reactor
Lf	Filter reactor
Cf	Filter condenser
Rf	Filter resistance
R0	Charge resistance
F	Fuse
73	Electromagnetic contactor for charge circuit
52	Electromagnetic contactor for power supply
6F	Electromagnetic contactor for filter circuit

(*1) Connect the step-down transformer to limit the voltage of the sequence circuit lower than 200V.
(*2) The auxiliary power supply input terminal for the PWM converter (R0, T0) must be connected to the main power supply via the contact "b" of the electromagnetic contactor for charge circuit (52).
(*3) Since the AC fan power supply receives power from R0 and T0 terminals, the power supply must be connected without passing the contact "b" of 73 or 52.
(*4) Use the sequence that a running signal is input in the inverter after the PWM converter becomes ready.
(*5) The 52T timer must be set to 1 sec.
(*6) One of terminals (X1 to X9) on the inverter must be set to external alarm (THR).
(*7) Be sure to arrange the phase sequence in the same order when wiring for terminals L1/R, L2/S, L3/T, R2, T2, R1, S1 and T1.

External Dimensions

PMW converter main body

Fig.A

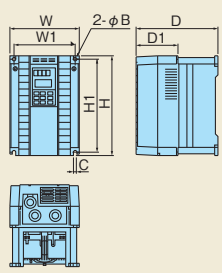


Fig.B

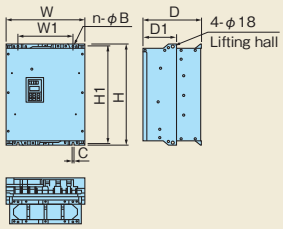


Fig.C

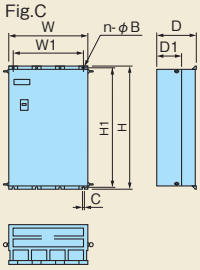
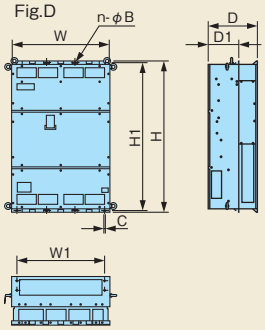


Fig.D



PWM converter type		Fig.	Dimensions[mm]									Approx. weight [kg]
			W	W1	H	H1	D	D1	n	B	C	
200V series	RHC7.5-2C	A	250	226	380	358	245	125	2	10	10	12.5
	RHC11-2C											
	RHC15-2C											
	RHC18.5-2C	B	340	240	480	460	255	145	2	10	10	24
	RHC22-2C											
	RHC30-2C	B	340	240	550	530	255	145	2	10	10	29
	RHC37-2C	B	375	275	615	595	270	145	2	10	10	36
	RHC45-2C	B	375	275	740	720	270	145	2	10	10	42
	RHC55-2C	B	375	275	740	720	270	145	2	10	10	44
	RHC75-2C	C	530	430	750	720	285	145	2	15	15	70
	RHC90-2C	C	680	580	880	850	360	220	3	15	15	115
400V series	RHC7.5-4C	A	250	226	380	358	245	125	2	10	10	12.5
	RHC11-4C											
	RHC15-4C											
	RHC18.5-4C	B	340	240	480	460	255	145	2	10	10	24
	RHC22-4C											
	RHC30-4C	B	340	240	550	530	255	145	2	10	10	29
	RHC37-4C	B	375	275	550	530	270	145	2	10	10	34
	RHC45-4C	B	375	275	675	655	270	145	2	10	10	38
	RHC55-4C	B	375	275	675	655	270	145	2	10	10	39
	RHC75-4C	B	375	275	740	720	270	145	2	10	10	48
	RHC90-4C	C	530	430	740	710	315	175	2	15	15	70
	RHC110-4C											
	RHC132-4C	C	530	430	1000	970	360	220	2	15	15	100
	RHC160-4C											
	RHC200-4C	C	680	580	1000	970	360	220	3	15	15	140
	RHC220-4C											
	RHC280-4C	C	680	580	1400	1370	450	285	3	15	15	320
	RHC315-4C											
	RHC355-4C	C	880	780	1400	1370	450	285	4	15	15	410
	RHC400-4C											
	RHC500-4C	D	999	900	1550	1520	500	313.2	4	15	15	525
	RHC630-4C											

〈Reactor for step-up〉

Fig.A

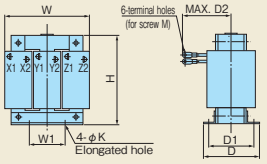


Fig.B

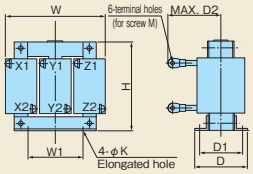


Fig.C

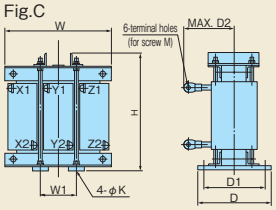
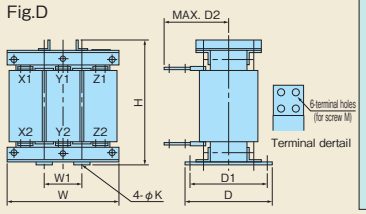


Fig.D



Reactor for step-up Type		Fig.	Dimensions[mm]								Approx. weight [kg]
			W	W1	H	D	D1	D2	K	M	
200V series	LR2-7.5C	A	180	75	205	105	85	95	7	M5	12
	LR2-15C	B	195	75	215	131	110	130	7	M8	18
	LR2-22C	C	240	80	340	215	180	145	10	M8	33
	LR2-37C	C	285	95	420	240	205	150	12	M10	50
	LR2-55C	C	285	95	420	250	215	160	12	M12	58
	LR2-75C	C	330	110	440	255	220	165	12	M12	70
	LR2-110C	C	345	115	500	280	245	185	12	M12	100
400V series	LR4-7.5C	B	180	75	205	105	85	90	7	M4	12
	LR4-15C	A	195	75	215	131	110	120	7	M5	18
	LR4-22C	C	240	80	340	215	180	120	10	M6	33
	LR4-37C	C	285	95	405	240	205	130	12	M8	50
	LR4-55C	C	285	95	415	250	215	145	12	M10	58
	LR4-75C	C	330	110	440	255	220	150	12	M10	70
	LR4-110C	C	345	115	490	280	245	170	12	M12	100
	LR4-160C	C	380	125	550	300	260	185	15	M12	140
	LR4-220C	C	450	150	620	330	290	230	15	M12	200
	LR4-280C	C	480	160	740	330	290	240	15	M16	250
	LR4-315C	C	480	160	760	340	300	250	15	M16	270
	LR4-355C	C	480	160	830	355	315	255	15	M16	310
	LR4-400C	C	480	160	890	380	330	260	19	M16	340
	LR4-500C	C	525	175	960	410	360	290	19	M16	420
	LR4-630C	D	600	200	640	440	390	290	19	4×M12	450

Wiring equipment

Wiring circuit breaker / wire sizes

Power supply voltage	Nominal applied motor [kW]	Inverter type	use	MCCB or ELCB rated current [A]		Magnetic contactor type					Recommended wire size [mm²]											
						For the input circuit		For the output circuit			Input circuit(L1/R,L2/S,L3/T)		Output circuit(U,V,W)			DC link circuit(P1,P(+))			Braking circuit(P(+),DB,N(-))		
				DCR		DCR		HD	MD	LD	DCR		HD	MD	LD	HD	MD	LD	HD	MD	LD
				provided	–	provided	–				provided	–									
3-phase 200V	0.75	FRN0.75VG1S-2J	HD	5	10	SC-05	SC-05	SC-05		–	2.0	2.0	2.0	–	–	2.0	–	–	2.0	–	–
	1.5	FRN1.5VG1S-2J		10	15																
	2.2	FRN2.2VG1S-2J			20																
	3.7	FRN3.7VG1S-2J		20	30		SC-5-1														
	5.5	FRN5.5VG1S-2J		30	50		SC-N1	SC-4-0				3.5	3.5			3.5					
	7.5	FRN7.5VG1S-2J		40	75	SC-5-1	SC-N2	SC-N1			3.5	5.5	5.5			5.5					
	11	FRN11VG1S-2J		50	100	SC-N1	SC-N2S				5.5	14	8.0(*3)			8.0(*3)					
	15	FRN15VG1S-2J		75	125	SC-N2	SC-N3	SC-N2			14	22	14			14					
	18.5	FRN18.5VG1S-2J		100	150	SC-N2S	SC-N4	SC-N2S								22					
	22	FRN22VG1S-2J			175		SC-N5	SC-N3			22	38(*1)	22								
	30	FRN30VG1S-2J	HD	150	200	SC-N4	SC-N7	SC-N4	–				38	–		38	–		3.5	–	
	37		LD	175	250	–	SC-N8			SC-N5	38	60	–		38	–		60	–		3.5
		FRN37VG1S-2J	HD			SC-N5		SC-N5		–			38		–	60		–	5.5		–
	45		LD	200	300	SC-N7		–		SC-N7	60	100	–		60	–		100	–		5.5
		FRN45VG1S-2J	HD					SC-N7		–			60		–	100		–	5.5		–
	55		LD	250	350	SC-N8	SC-N11	–		SC-N8	100		–		100	–		100	–		5.5
		FRN55VG1S-2J	HD					SC-N8		–			100		–	100		–	8.0		–
	75		LD	350	–	SC-N11	–	–		SC-N10	150(*2)	–	–		150(*2)	–		150(*2)	–		8.0
		FRN75VG1S-2J	HD					SC-N11		–			150		–	150		–	14		–
	90		LD	400		–		–		SC-N11	150	–	–		150	–		200	–		14
		FRN90VG1S-2J	HD					SC-N11		–			150		–	200		–	22		–
	110		LD	500		SC-N12		–		SC-N12	200		–		200	–		250	–		22
3-phase 400V	3.7	FRN3.7VG1S-4J	HD	10	20	SC-05	SC-05	SC-05	–	–	2.0	2.0	2.0	–	–	2.0	–	–	2.0	–	–
	5.5	FRN5.5VG1S-4J		15	30		SC-4-0														
	7.5	FRN7.5VG1S-4J		20	40		SC-5-1														
	11	FRN11VG1S-4J		30	50	SC-05	SC-N1	SC-4-0				3.5	3.5			3.5					
	15	FRN15VG1S-4J		40	60	SC-5-1		SC-5-1			3.5	5.5				5.5					
	18.5	FRN18.5VG1S-4J			75	SC-N1	SC-N2	SC-N1			5.5	8.0(*3)	5.5								
	22	FRN22VG1S-4J		50	100		SC-N2S					14	8.0(*3)			8.0(*3)					
	30	FRN30VG1S-4J	HD	75	125	SC-N2	SC-N3	SC-N2					14			14					
	37		LD	100		SC-N2S	SC-N4	–	–	SC-N2S	14	22	–	–	14	–	–	22	–	–	2.0
		FRN37VG1S-4J	HD					SC-N2S		–			14		–	22		–	2.0		–
	45		LD		150	SC-N3		–		SC-N3	22	38	–		22	–		22	–		2.0
		FRN45VG1S-4J	HD					SC-N3		–			22		–	22		–	2.0		–
	55		LD	125	200		SC-N5	–		SC-N4			–		38	–		38	–		2.0
		FRN55VG1□-4J	HD					SC-N4		–			38		–	38		–	3.5		–
	75		LD	175	–	SC-N4	–	–		SC-N5	38	–	–		60	–		60	–		3.5
		FRN75VG1□-4J	HD					SC-N5		–			60		–	60		–	5.5		–
	90		LD	200		SC-N7		–		SC-N7	60	–	–		60	–		100	–		5.5
		FRN90VG1□-4J	HD					SC-N7		–			60		–	100		–	5.5		–
	110		MD/LD	250		SC-N8		–	SC-N8	SC-N8	100	–	–	100	100	–	100	100	–	8.0	5.5
		FRN110VG1□-4J	HD					SC-N8	–	–			100	–	–	100	–	–	8.0	–	–
	132		MD/LD	300				–	SC-N8	SC-N8			–	100	100	–	150	150	–	14	8.0
		FRN132VG1□-4J	HD					SC-N8	–	–			100	–	–	150	–	–	14	–	–
	160		MD/LD	350		SC-N11		–	SC-N11	SC-N11	150	–	–	150	150	–	150	150	–	14	14
		FRN160VG1□-4J	HD					SC-N11	–	–			150	–	–	150	–	–	14	–	–
	200		MD/LD	500		SC-N12		–	SC-N12	SC-N12			–	200	200	–	250	250	–	22	14
		FRN200VG1□-4J	HD					SC-N12	–	–			200	–	–	250	–	–	22	–	–
	220		MD/LD					–	SC-N12	SC-N12	200		–	200	200	–	250	250	–	22	22
		FRN220VG1□-4J	HD					SC-N12	–	–			200	–	–	250	–	–	22	–	–
	250		MD	600	–	–	–	–	SC-N14		250	–	–	250	–	–	325	–	–	38	–
	280		LD			SC-N14			–	SC-N14			–	–	325	–	–	2x200	–	–	22
		FRN280VG1□-4J	HD					SC-N14		–			325	–	–	2x200	–	–	38	–	–
	315		MD	800		SC-N14		–	SC-N14		2x150		–	325	–	–	2x200	–	–	38	–
	355		LD						–	SC-N14	2x200		–	–	2x200	–	–	2x250	–	–	38
	315		HD					SC-N14		–	2x150		325	–	–	2x200	–	–	38	–	–
	355	FRN315VG1□-4J	MD					–	SC-N14				–	2x200	–	–	2x250	–	–	60	–
	400		LD	1200		SC-N16			–	SC-N16	2x200		–	–	2x250	–	–	2x325	–	–	60
	355		HD	800		SC-N14		SC-N14		–			2x200	–	–	2x250	–	–	60	–	–
	400	FRN355VG1□-4J	MD					–	SC-N16				–	2x250	–	–	2x325	–	–	60	–
	450		LD			SC-N16			–	610CM(*4)	2x250		–	–	2x250	–	–	2x325	–	–	60
	400		HD	1200				SC-N16		–	2x200		2x250	–	–	2x325	–	–	60	–	–
	450	FRN400VG1□-4J	MD					–	M610CM(*4)		2x250		–	2x250	–	–	2x325	–	–	100	–
	500		LD			610CM (*4)				610CM(*4)	2x325		2x325	–	2x325	–	–	3x325	–	–	60
		FRN500VG1□-4J	HD			610CM(*4)			–	–			2x325	–	–	3x325	–	–	100	–	–
	630		LD	1400		612CM (*4)		–	–	612CM(*4)	3x325		–	–	3x325	–	–	3x325	–	–	100
		FRN630VG1□-4J	HD			612CM(*4)				–			3x325	–	–	3x325	–	–	150	–	–
	710		LD	1600		616CM(*4)		–	–	616CM(*4)	4x250		–	–	4x325	–	–	4x325	–	–	150

•For molded-case circuit breakers (MCCBs) or earth-leakage circuit breakers (ELCBs), the required frame type and series depends on factors such as the transformer capacity of the facility. Refer to catalogs and data sheets to select optimal ones. Also, refer to data sheets on ECLB for rated sensitive current.
The rated currents for MCCB and ELCB on the table above are for FUJI SA□B/□ and SA□R/□.
•The recommended wire sizes are based on a condition where the temperature inside the panel is 50˚C or less.
•Data on the table above are obtained with 600V HIV insulation cables (Allowable temp. 75˚C).
•Data on the table above may change under different conditions such as different ambient temperature or different power supply voltage.
*1) Use the crimp terminal no. 38-6 made by J.S.T. Mfg Co.,Ltd. or equivalent.
*2) Use the JEM1399 low pressure crimp terminal CB150-10.
*3) Use the crimp terminal no. 8-L6 made by J.S.T. Mfg Co.,Ltd., or equivalent.
*4) 610CM, 612CM, 616CM: made by Aichi Electric Works Co., Ltd.

Warranty

To all our customers who purchase Fuji Electric products included in this catalog:

Please take the following items into consideration when placing your order.

When requesting an estimate and placing your orders for the products included in these materials, please be aware that any items such as specifications which are not specifically mentioned in the contract, catalog, specifications or other materials will be as mentioned below.
In addition, the products included in these materials are limited in the use they are put to and the place where they can be used, etc., and may require periodic inspection. Please confirm these points with your sales representative or directly with this company.
Furthermore, regarding purchased products and delivered products, we request that you take adequate consideration of the necessity of rapid receiving inspections and of product management and maintenance even before receiving your products.

1. Free of Charge Warranty Period and Warranty Range

1-1 Free of charge warranty period

(1) The product warranty period is "1 year from the date of purchase" or 24 months from the manufacturing date imprinted on the name plate, whichever date is earlier.
(2) However, in cases where the use environment, conditions of use, use frequency and times used, etc., have an effect on product life, this warranty period may not apply.
(3) Furthermore, the warranty period for parts restored by Fuji Electric's Service Department is "6 months from the date that repairs are completed."

1-2 Warranty range

(1) In the event that breakdown occurs during the product's warranty period which is the responsibility of Fuji Electric, Fuji Electric will replace or repair the part of the product that has broken down free of charge at the place where the product was purchased or where it was delivered. However, if the following cases are applicable, the terms of this warranty may not apply.
  1) The breakdown was caused by inappropriate conditions, environment, handling or use methods, etc. which are not specified in the catalog, operation manual, specifications or other relevant documents.
  2) The breakdown was caused by the product other than the purchased or delivered Fuji's product.
  3) The breakdown was caused by the product other than Fuji's product, such as the customer's equipment or software design, etc.
  4) Concerning the Fuji's programmable products, the breakdown was caused by a program other than a program supplied by this company, or the results from using such a program.
  5) The breakdown was caused by modifications or repairs affected by a party other than Fuji Electric.
  6) The breakdown was caused by improper maintenance or replacement using consumables, etc. specified in the operation manual or catalog, etc.
  7) The breakdown was caused by a science or technical problem that was not foreseen when making practical application of the product at the time it was purchased or delivered.
  8) The product was not used in the manner the product was originally intended to be used.
  9) The breakdown was caused by a reason which is not this company's responsibility, such as lightning or other disaster.

(2) Furthermore, the warranty specified herein shall be limited to the purchased or delivered product alone.
(3) The upper limit for the warranty range shall be as specified in item (1) above and any damages (damage to or loss of machinery or equipment, or lost profits from the same, etc.) consequent to or resulting from breakdown of the purchased or delivered product shall be excluded from coverage by this warranty.

1-3. Trouble diagnosis

As a rule, the customer is requested to carry out a preliminary trouble diagnosis. However, at the customer's request, this company or its service network can perform the trouble diagnosis on a chargeable basis. In this case, the customer is asked to assume the burden for charges levied in accordance with this company's fee schedule.

2. Exclusion of Liability for Loss of Opportunity, etc.

Regardless of whether a breakdown occurs during or after the free of charge warranty period, this company shall not be liable for any loss of opportunity, loss of profits, or damages arising from special circumstances, secondary damages, accident compensation to another company, or damages to products other than this company's products, whether foreseen or not by this company, which this company is not be responsible for causing.

3. Repair Period after Production Stop, Spare Parts Supply Period (Holding Period)

Concerning models (products) which have gone out of production, this company will perform repairs for a period of 7 years after production stop, counting from the month and year when the production stop occurs. In addition, we will continue to supply the spare parts required for repairs for a period of 7 years, counting from the month and year when the production stop occurs. However, if it is estimated that the life cycle of certain electronic and other parts is short and it will be difficult to procure or produce those parts, there may be cases where it is difficult to provide repairs or supply spare parts even within this 7-year period. For details, please confirm at our company's business office or our service office.

4. Transfer Rights

In the case of standard products which do not include settings or adjustments in an application program, the products shall be transported to and transferred to the customer and this company shall not be responsible for local adjustments or trial operation.

5. Service Contents

The cost of purchased and delivered products does not include the cost of dispatching engineers or service costs. Depending on the request, these can be discussed separately.

Required Delivery Period and Code

Inverters

Model	Standard applicable motor [kW]		Standard type			
	HD specification	LD specification	Type	HD/LD	Product no. code	Delivery period
3-phase 200V	0.75	–	FRN0.75VG1S-2J	HD	RHJ2701	Standard product
	1.5	–	FRN1.5VG1S-2J		RHJ2702	
	2.2	–	FRN2.2VG1S-2J		RHJ2703	
	3.7	–	FRN3.7VG1S-2J		RHJ2704	
	5.5	–	FRN5.5VG1S-2J		RHJ2705	
	7.5	–	FRN7.5VG1S-2J		RHJ2706	
	11	–	FRN11VG1S-2J		RHJ2707	
	15	–	FRN15VG1S-2J		RHJ2708	
	18.5	–	FRN18.5VG1S-2J		RHJ2709	
	22	–	FRN22VG1S-2J		RHJ2710	
	30	37	FRN30VG1S-2J	HD/LD	RHJ2711	
	37	45	FRN37VG1S-2J	HD/LD	RHJ2712	
	45	55	FRN45VG1S-2J	HD/LD	RHJ2713	
	55	–	FRN55VG1S-2J	HD	RHJ2714	BTO
	–	75	*	LD	RHJ2733	
3-phase 400V	3.7	–	FRN3.7VG1S-4J	HD	RHJ4051	Standard product
	5.5	–	FRN5.5VG1S-4J		RHJ4052	
	7.5	–	FRN7.5VG1S-4J		RHJ4053	
	11	–	FRN11VG1S-4J		RHJ4054	
	15	–	FRN15VG1S-4J		RHJ4055	
	18.5	–	FRN18.5VG1S-4J		RHJ4056	
	22	–	FRN22VG1S-4J		RHJ4057	
	30	37	FRN30VG1S-4J	HD/LD	RHJ4058	
	37	45	FRN37VG1S-4J	HD/LD	RHJ4059	
	45	55	FRN45VG1S-4J	HD/LD	RHJ4060	
	55	–	FRN55VG1S-4J	HD	RHJ4061	BTO
	–	75	*	LD	RHJ4304	

* When a motor which is larger than the inverter by one frame or more is driven with FRN55VG1□-2J/4J or more (applicable motor 75kW or more), the DC Reactor that comes equipped with as standard is different between HD and LD specifications. (Shifted by one frame)
* For the inverters with a capacity or of a type other than the above, contact our Sales department.

Options1

Category	Name	Type	Product no. code	Delivery period
Analog	Aio extended card	OPC-VG1-AIO	RHWJ296	BTO
	Ai extended card	OPC-VG1-AI	RHWJ297	
Digital (8bit bus supported)	Di interface card	OPC-VG1-DI	RHWJ298	
	Dio extended card	OPC-VG1-DIO	RHWJ299	
	PG interface extended card	OPC-VG1-PG	RHWJ285	
		OPC-VG1-PGo	RHWJ287	
		OPC-VG1-SPGT	RHWJ291	
	PG card for synchronous motor drive	OPC-VG1-PMPG	RHWJ286	
		OPC-VG1-PMPGo	RHWJ290	
	T-Link interface card	OPC-VG1-TL	RHWJ280	
	CC-Link interface card	OPC-VG1-CCL	RHWJ282	
Digital (16bit bus supported)	SX bus interface card	OPC-VG1-SX	RHWJ281	
	E-SX bus interface card	OPC-VG1-ESX	RHWJ293	
Safety	Safety function card	OPC-VG1-SAFE	RHWJ302	
Control circuit terminal	Terminal block for high-speed serial communications	OPC-VG1-TBSI	RHWJ305	
Battery	Memory backup battery *1	OPK-BP	RHWJ288	
PC loader	FRENIC-VG loader	WPS-VG1-PCL	RHWJ901	Standard product

*1: Optional to the models up to 22kW; standard equipment for the models up to 30kW.

Options2

Unit	Input power of applicable inverter	Type	Product no. code	Delivery period
Braking resistor (10% ED)	3-phase 200V	DB2.2V-21B	RHWJ30A	Standard product
		DB3.7V-21B	RHWJ30B	
		DB5.5V-21B	RHWJ30C	
		DB7.5V-21B	RHWJ30D	
		DB11V-21B	RHWJ30E	
		DB15V-21B	RHWJ30F	
		DB18.5V-21B	RHWJ30G	
		DB22V-21B	RHWJ30H	
		DB30V-21B	RHWJ30I	
		DB37V-21B	RHWJ30J	
		DB45V-21B	RHWJ30K	
		DB55V-21C	RHWJ30L	BTO
	3-phase 400V	DB3.7V-41B	RHWJ31A	Standard product
		DB5.5V-41B	RHWJ31B	
		DB7.5V-41B	RHWJ31C	
		DB11V-41B	RHWJ31D	
		DB15V-41B	RHWJ31E	
		DB18.5V-41B	RHWJ31F	
		DB22V-41B	RHWJ31G	
		DB30V-41B	RHWJ31H	
		DB37V-41B	RHWJ31I	
		DB45V-41B	RHWJ31J	
		DB55V-41C	RHWJ31K	BTO

Dedicated motor (induction motor)

Input power	Capacity[kW]	Type	Product no. code	Delivery period
3-phase 200V	0.75	MVK8095A	MVK2201	Standard product
	1.5	MVK8097A	MVK2202	
	2.2	MVK8107A	MVK2203	
	3.7	MVK8115A	MVK2204	
	5.5	MVK8133A	MVK2205	
	7.5	MVK8135A	MVK2206	
	11	MVK8165A	MVK2107	
	15	MVK8167A	MVK2108	
	18.5	MVK8184A	MVK2109	
	22	MVK8185A	MVK2110	
	30	MVK8187A	MVK2111	
	37	MVK8207A	MVK2112	
	45	MVK8208A	MVK2113	
3-phase 400V	3.7	MVK8115A	MVK2254	Standard product
	5.5	MVK8133A	MVK2255	
	7.5	MVK8135A	MVK2256	
	11	MVK8165A	MVK2157	
	15	MVK8167A	MVK2158	
	18.5	MVK8184A	MVK2159	
	22	MVK8185A	MVK2160	
	30	MVK8187A	MVK2161	
	37	MVK8207A	MVK2162	
	45	MVK8208A	MVK2163	

Dedicated motor (induction motor w/ sensor)

Input power	Capacity[kW]	Type	Product no. code	Delivery period
3-phase 200V	5.5	GNF2114A	GNF1010	Standard product
	7.5	GNF2115A	GNF1011	
	11	GNF2117A	GNF1012	
	15	GNF2118A	GNF1013	
	18.5	GNF2136A	GNF1014	
	22	GNF2137A	GNF1015	
	30	GNF2139A	GNF1016	
	37	GNF2165A	GNF1017	
	45	GNF2167A	GNF1018	
	55	GNF2185A	–	BTO
3-phase 400V	5.5	GNF2114A	GNF1020	Standard product
	7.5	GNF2115A	GNF1021	
	11	GNF2117A	GNF1022	
	15	GNF2118A	GNF1023	
	18.5	GNF2136A	GNF1024	
	22	GNF2137A	GNF1025	
	30	GNF2139A	GNF1026	
	37	GNF2165A	GNF1027	
	45	GNF2167A	GNF1028	
	55	GNF2185A	GNF1029	
	75	GNF2187A	GNF1030	
	90	GNF2207A	GNF1031	

Guideline for Suppressing Harmonics

Application to "Guideline for Suppressing Harmonics by the Users Who Receive High Voltage or Special High Voltage"

Our FRENIC series are the products specified in the "Guideline for Suppressing Harmonics by Customers Receiving High Voltage or Special High Voltage." When you enter into a new contract with an electric power company or update a contract, you are requested by the electric power company to submit an accounting statement form.

(1) Scope of regulation

In principle, the guideline applies to the customers that meet the following two conditions:
- The customer receives high voltage or special high voltage.
- The "equivalent capacity" of the converter load exceeds the standard value for the receiving voltage (50kVA at a receiving voltage of 6.6kV).

(2) Regulation method

The level (calculated value) of the harmonic current that flows from the customer's receiving point out to the system is subjected to the regulation. The regulation value is proportional to the contract demand. The regulation values specified in the guideline are shown in Table 1.

Table 1 Upper limits of harmonic outflow current per kW of contract demand [mA/kW]

Receiving voltage	5th	7th	11th	13th	17th	19th	23th	Over 25th
6.6kV	3.5	2.5	1.6	1.3	1.0	0.90	0.76	0.70
22kV	1.8	1.3	0.82	0.69	0.53	0.47	0.39	0.36

1. Calculation of Equivalent Capacity (Pi)

Although the equivalent capacity (Pi) is calculated using the equation of (input rated capacity) x (conversion factor), catalog of conventional inverters do not contain input rated capacities. A description of the input rated capacity is shown below:

(1) "Inverter rated capacity" corresponding to "Pi"

- Calculate the input fundamental current I1 from the kW rating and efficiency of the load motor, as well as the efficiency of the inverter. Then, calculate the input rated capacity as shown below:
  Input rated capacity = $\sqrt{3}$ x (power supply voltage) x I1 x 1.0228/1000[kVA]
  Where 1.0228 is the 6-pulse converter's value obtained by (effective current) / (fundamental current).
- When a general-purpose motor or inverter motor is used, the appropriate value shown in Table 2 can be used. Select a value based on the kW rating of the motor used, irrespective of the inverter type.

Table 2 "Input rated capacities" of general-purpose inverters determined by the nominal applied motors

Nominal applied motor [kW]		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
Pi [kVA]	200V	0.57	0.97	1.95	2.81	4.61	6.77	9.07	13.1	17.6	21.8	25.9
	400V	0.57	0.97	1.95	2.81	4.61	6.77	9.07	13.1	17.6	21.8	25.9

Nominal applied motor [kW]		30	37	45	55	75	90	110	132	160	200	220
Pi [kVA]	200V	34.7	42.8	52.1	63.7	87.2	104	127				
	400V	34.7	42.8	52.1	63.7	87.2	104	127	153	183	229	252

Nominal applied motor [kW]		250	280	315	355	400	450	500	530	560	630
Pi [kVA]	200V										
	400V	286	319	359	405	456	512	570	604	638	718

(2) Values of "Ki (conversion factor)"

- Depending on whether an optional ACR (AC REACTOR) or DCR (DC REACTOR) is used, apply the appropriate conversion factor specified in the appendix to the guideline. The values of the converter factor are shown in Table 3.

Table 3 "Conversion factors Ki" for general-purpose inverters determined by reactors

Circuit category	Circuit type		Conversion factor Ki	Main applications
3	Three-phase bridge 3 (capacitor smoothing)	Without a reactor	K31=3.4	• General-purpose inverters • Elevators • Refrigerators, air conditioning systems • Other general appliances
		With a reactor (ACR)	K32=1.8	
		With a reactor (DCR)	K33=1.8	
		With reactors (ACR and DCR)	K34=1.4	

2. Calculation of Harmonic Current

(1) Value of "input fundamental current"

- Apply the appropriate value shown in Table 4 based on the kW rating of the motor, irrespective of the inverter type or whether a reactor is used.

* If the input voltage is different, calculate the input fundamental current in inverse proportion to the voltage.

Table 4 "Input fundamental currents" of general-purpose inverters determined by the nominal applied motors

Nominal applied motor [kW]		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
Input fundamental current [A]	200V	1.62	2.74	5.50	7.92	13.0	19.1	25.6	36.9	49.8	61.4	73.1
	400V	0.81	1.37	2.75	3.96	6.50	9.55	12.8	18.5	24.9	30.7	36.6
6.6 kV converted value [mA]		49	83	167	240	394	579	776	1121	1509	1860	2220

Nominal applied motor [kW]		30	37	45	55	75	90	110	132	160	200	220
Input fundamental current [A]	200V	98.0	121	147	180	245	293	357				
	400V	49.0	60.4	73.5	89.9	123	147	179	216	258	323	355
6.6 kV converted value [mA]		2970	3660	4450	5450	7450	8910	10850	13090	15640	19580	21500

Nominal applied motor [kW]		250	280	315	355	400	450	500	530	560	630
Input fundamental current [A]	200V										
	400V	403	450	506	571	643	723	804	852	900	1013
6.6 kV converted value [mA]		24400	27300	30700	34600	39000	43800	48700	51600	54500	61400

(2) Calculation of harmonic current

Table 5 Generated harmonic current [%], 3-phase bridge (capacitor smoothing)

Degree	5th	7th	11th	13th	17th	19th	23th	25th
Without a reactor	65	41	8.5	7.7	4.3	3.1	2.6	1.8
With a reactor (ACR)	38	14.5	7.4	3.4	3.2	1.9	1.7	1.3
With a reactor (DCR)	30	13	8.4	5.0	4.7	3.2	3.0	2.2
With reactors (ACR and DCR)	28	9.1	7.2	4.1	3.2	2.4	1.6	1.4

- ACR: 3%
- DCR: Accumulated energy equal to 0.08 to 0.15ms (100% load conversion)
- Smoothing capacitor: Accumulated energy equal to 15 to 30ms (100% load conversion)
- Load: 100%

■ nth harmonic current [A] = Fundamental current [A] $\times \frac{\text{Generated nth harmonic current [\%]}}{100}$

Calculate the harmonic current of each degree using the following equation:

(3) Maximum availability factor

- For a load for elevators, which provides intermittent operation, or a load with a sufficient designed motor rating, reduce the current by multiplying the equation by the "maximum availability factor" of the load.
- The "maximum availability factor of an appliance" means the ratio of the capacity of the harmonic generator in operation at which the availability reaches the maximum, to its total capacity, and the capacity of the generator in operation is an average for 30 minutes.
- In general, the maximum availability factor is calculated according to this definition, but the standard values shown in Table 6 are recommended for inverters for building equipment.

Table 6 Availability factors of inverters, etc. for building equipment (standard values)

Equipment type	Inverter capacity category	Single inverter availability factor
Air conditioning system	200kW or less	0.55
	Over 200kW	0.60
Sanitary pump	———	0.30
Elevator	———	0.25
Refrigerator, freezer	50kW or less	0.60
UPS (6-pulse)	200kVA	0.60

[Correction coefficient according to contract demand level]

- Since the total availability factor decreases with increase in the building scale, calculating reduced harmonics with the correction coefficient s defined in Table 7 below is permitted.

Table 7 Correction coefficient according to the building scale

Contract demand [kW]	Correction coefficient b
300	1.00
500	0.90
1000	0.85
2000	0.80

*If the contract demand is between two specified values shown in Table 7, calculate the value by interpolation.

(4) Degree of harmonics to be calculated

Calculate only the "5th and 7th" harmonic currents

NOTES

When running general-purpose motors

• Driving a 400V general-purpose motor
When driving a 400V general-purpose motor with an inverter using extremely long cables, damage to the insulation of the motor may occur. Use an output circuit filter (OFL) if necessary after checking with the motor manufacturer. Fuji's motors do not require the use of output circuit filters because of their reinforced insulation.

• Torque characteristics and temperature rise
When the inverter is used to run a general-purpose motor, the temperature of the motor becomes higher than when it is operated using a commercial power supply. In the low-speed range, the cooling effect will be weakened, so decrease the output torque of the motor. If constant torque is required in the low-speed range, use a Fuji inverter motor or a motor equipped with an externally powered ventilating fan.

• Vibration
When the motor is mounted to a machine, resonance may be caused by the natural frequencies, including that of the machine. Operation of a 2-pole motor at 60Hz or more may cause abnormal vibration.
* Study use of tier coupling or dampening rubber.
* It is also recommended to use the inverter jump frequency control to avoid resonance points.

• Noise
When an inverter is used with a general-purpose motor, the motor noise level is higher than that with a commercial power supply. To reduce noise, raise carrier frequency of the inverter. High-speed operation at 60Hz or more can also result in more noise.

When running special motors

• Explosion-proof motors
When driving an explosion-proof motor with an inverter, use a combination of a motor and an inverter that has been approved in advance.

• Brake motors
For motors equipped with parallel-connected brakes, their braking power must be supplied from the primary circuit (commercial power supply). If the brake power is connected to the inverter power output circuit (secondary circuit) by mistake, problems may occur.
Do not use inverters for driving motors equipped with series-connected brakes.

• Geared motors
If the power transmission mechanism uses an oil-lubricated gearbox or speed changer/reducer, then continuous motor operation at low speed may cause poor lubrication. Avoid such operation.

• Single-phase motors
Single-phase motors are not suitable for inverter-driven variable speed operation. Use three-phase motors.

Environmental conditions

• Installation location
Use the inverter in a location with an ambient temperature range of -10 to 50˚C.
The inverter and braking resistor surfaces become hot under certain operating conditions. Install the inverter on nonflammable material such as metal.
Ensure that the installation location meets the environmental conditions specified in "Environment" in inverter specifications.

Combination with peripheral devices

• Installing a molded case circuit breaker (MCCB)
Install a recommended molded case circuit breaker (MCCB) or an earth leakage circuit breaker (ELCB) in the primary circuit of each inverter to protect the wiring. Ensure that the circuit breaker capacity is equivalent to or lower than the recommended capacity.

• Installing a magnetic contactor (MC) in the output (secondary) circuit
If a magnetic contactor (MC) is mounted in the inverter's secondary circuit for switching the motor to commercial power or for any other purpose, ensure that both the inverter and the motor are fully stopped before you turn the MC on or off. Remove the surge killer integrated with the MC.

• Installing a magnetic contactor (MC) in the input (primary) circuit
Do not turn the magnetic contactor (MC) in the primary circuit on or off more than once an hour as an inverter fault may result. If frequent starts or stops are required during motor operation, use FWD/REV signals.

• Protecting the motor
The electronic thermal facility of the inverter can protect the general-purpose motor. The operation level and the motor type (general-purpose motor, inverter motor) should be set. For high-speed motors or water-cooled motors, set a small value for the thermal time constant to protect the motor.
If you connect the motor thermal relay to the motor with a long cable, a high-frequency current may flow into the wiring stray capacitance. This may cause the relay to trip at a current lower than the set value for the thermal relay. If this happens, lower the carrier frequency or use the output circuit filter (OFL).

• Discontinuance of power-factor correcting capacitor
Do not mount power factor correcting capacitors in the inverter (primary) circuit. (Use the DC REACTOR to improve the inverter power factor.) Do not use power factor correcting capacitors in the inverter output circuit (secondary). An overcurrent trip will occur, disabling motor operation.

• Discontinuance of surge killer
Do not mount surge killers in the inverter output (secondary) circuit.

• Reducing noise
Use of a filter and shielded wires are typical measures against noise to ensure that EMC Directives are met.

• Measures against surge currents
If an overvoltage trip occurs while the inverter is stopped or operated under a light load, it is assumed that the surge current is generated by open/close of the phase-advancing capacitor in the power system.
We recommend connecting a DC REACTOR to the inverter.

• Megger test
When checking the insulation resistance of the inverter, use a 500V megger and follow the instructions contained in the Instruction Manual.

Wiring

• Wiring distance of control circuit
When performing remote operation, use the twisted shield wire and limit the distance between the inverter and the control box to 20m.

• Wiring length between inverter and motor
If long wiring is used between the inverter and the motor, the inverter will overheat or trip as a result of overcurrent (high-frequency current flowing into the stray capacitance) in the wires connected to the phases. Ensure that the wiring is shorter than 50m. If this length must be exceeded, lower the carrier frequency or mount an output circuit filter (OFL).
When wiring is longer than 50m, and sensorless vector control or vector control with speed sensor is selected, execute off-line tuning.

• Wiring size
Select cables with a sufficient capacity by referring to the current value or recommended wire size.

• Wiring type
Do not use multicore cables that are normally used for connecting several inverters and motors.

• Grounding
Securely ground the inverter using the grounding terminal.

Selecting inverter capacity

• Driving general-purpose motor
Select an inverter according to the applicable motor ratings listed in the standard specifications table for the inverter. When high starting torque is required or quick acceleration or deceleration is required, select an inverter with a capacity one size greater than the standard.

• Driving special motors
Select an inverter that meets the following condition: Inverter rated current > Motor rated current.

Transportation and storage

When transporting or storing inverters, follow the procedures and select locations that meet the environmental conditions that agree with the inverter specifications.

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